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THE PROBLEM OF INTERNATIONAL X-RAY STANDARDIZATION[1]

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THE advisability of using some precise physical means for measuring the X-ray beam intensity in medical treatment is no longer in question. It has been shown repeatedly that whereas the expression of intensity in terms of peak voltage, tube milliamperes, and time may be satisfactory within a single clinic, it is not only inadequate but misleading if a dose is to be repeated at some other place, where the machines, tubes, and technic in all probability differ from those of the first clinic. As a consequence, we now find an increasing use of so-called "dosage meters," most of which employ the ionizing power of X-rays to give an indirect measure of the X-ray intensity.

The problem for the physicist is to devise a system for accurately describing the X-ray beam which the physician applies in his treatments. This may be done in a number of ways, most of which are practical only in the specialized physical laboratory. In order, however, to be of the most assistance to the radiologist or biologist the latter must inform the physicist what he wishes to be measured. Thus, shall we be content to devise an accurate method for reproducing a given beam intensity of definite spectral energy distribution, or shall we devise a method which gives a quantity proportional to the actual biological reaction, if such be possible (1, 24)? The present method of measuring air ionization will probably be quite adequate for the first question. Before the second question can be answered, the biologist must give the physicist a great deal of unambiguous information which at present is not known—or, at least, is not in general acceptance.

If it were agreed that an absolute measurement was wanted, proportional to the energy in ergs received by the tissues, we would find a disagreement between some of the leading physicists regarding the strict proportionality between the total energy of an X-ray beam and its ionizing power over the whole range of wave lengths used in therapy (2, 3, 4). Should the progress of biological studies demand this measurement, then the relation between the energy and ionizing power of X-rays would need to be investigated further if we were to answer the second question. These are questions which must be answered in the future, and until then, our efforts must be directed toward improving and making more practical the physical methods of measuring X-ray intensity.

Having a large number of dosage meters

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all of which may yield consistent measurements individually, value to the art as a whole lies in their precise agreement with some accepted standard. This, of course, presupposes their correct use in treatment. Then, in order that the measurements may be of international value, the standards accepted by each country must be made to agree to a much higher degree of precision —a far more difficult problem than that of calibrating a dosage meter against some one arbitrary standard. The calibration of a dosage meter to within ±5 per cent may be quite satisfactory for the present needs, whereas the international standards should agree to at least one-tenth of that, or within from 0.5 to 1.0 per cent. Solomon's method of standardization against radium radiation proved to be very efficacious in France where all the "iontoquantimeters" were calibrated against his extremely arbitrary arrangement, but the reproduction of his standard to a fine degree of physical precision is practically impossible (5). Rajewsky is endeavoring to develop a different standard source of radium radiation in which the arbitrary factors of Solomon shall be eliminated (6). This goal is not yet achieved, but if it is, it may entirely supersede the standard open air ionization chamber.

For the past two years, the X-ray Section of the Bureau of Standards has been devoting most of its attention to the problem of X-ray intensity standardization. The problem has been previously studied by Behnken (7), Duane (8, 9), Failla (10), Glasser (11), and others (12, 13), but in view of the experimental difficulties involved, it was thought wise to repeat their investigations to be certain that every possible source of error was properly considered. To do this, a special X-ray equipment giving constant potential was installed (14). The input voltage for this is supplied by a synchronous motor generator set and is further regulated by a special line voltage stabilizer, so that the maximum primary voltage does not vary by more than 0.1 per cent. The ionization measuring system is null reading, with the exposure times controlled by the Bureau's master clock to within ±0.01 second. With careful operation by the observer, the electrical measurements can be easily duplicated to within ±0.2 per cent.

It is the purpose of this paper to review very superficially the results of some of our investigations. It is not the intention to show only the difficulties in the present methods of measuring X-ray intensity, but to indicate some which demand further investigation in order that their importance may be better known. It is hoped that other workers will study some of the questions raised, to the end that X-rays may be more effectively applied in the field of medical treatment.

In 1927 Behnken, of the Reichsanstalt, transported a pair of calibrated dosage meters between several different laboratories, measuring the "standard unit" established by each (15). His results showed the very fair agreement of about ±4 per cent. However, there was established in most cases a somewhat arbitrary system of diaphragms to define the X-ray beam which entered the standard chamber. Investigations at the Bureau of Standards (16) and by Failla (10) have independently shown that by comparatively slight variations in the diaphragm arrangement the "ionization in a cubic centimeter of air" could be varied between wide limits. This fact alone indicates a certain degree of arbitrariness in our present methods of measuring the r-unit,[2] and as long as this state exists, further investigations must be made. It has been found that in all prob-

[2] " . . . the quantity of radiation, which, when the secondary electrons are fully utilized and the wall effect of the chamber is avoided, produces in one cubic centimeter of atmospheric air at 0° C. and 76 cm. mercury pressure such a degree of conductivity that one electrostatic unit of charge is measured at saturation current." This unit is called the 'Röntgen' and is designated by small 'r.' "

ability there exists a large number of errors in our present measurements, some of which partly counterbalance others.

In the primary standard ionization chamber, an appreciable error was found to be due to electrostatic field distortion caused by the electrical measuring method (14). This produced an error in the effective volume of air ionized and, correspondingly, in the r-unit. To eliminate it, the Bureau adopted the null electrostatic measuring method, in which there is no field distortion produced. Failla (10) independently arrived at a similar scheme, and it is of interest to note that more recently the Physikalisch-Technischen Reichsanstalt has also adopted an ingenious null method (17).

In calculating the effective volume of air ionized in a standard chamber, the X-ray tube focus has usually been considered as a point (7, 18). However, when measuring the ionization at different distances from the tube it was found that the inverse square law of intensity was never strictly obeyed, the divergence from the true law depending largely upon the size of the diaphragm placed near the tube to screen off stem radiation. This divergence was found to be due to "off-focus" radiation (16) coming from parts of the target face other than the sharply defined focal spot. Consequently the magnitude of this error will depend upon the size of such a diaphragm—heretofore of a perfectly arbitrary size and shape. To eliminate it, the limiting diaphragm is made of such size that the focal spot fills the aperture of the system formed by this diaphragm and that of the standard chamber. When using *any* convenient size of limiting diaphragm that fills the above condition, it is found that the inverse square law is strictly obeyed and the arbitrary choice of diaphragm no longer matters. In using such an arrangement, however, the limiting diaphragm must be treated as the source of radiation and the inverse square law applied thereto, instead of to the target.

A fundamental assumption in calculating the air volume ionized is that the beam intensity be uniform over the area of the standard chamber diaphragm. Thus an error of importance was found when the radiation for the standard chamber was taken off the target at a glancing angle, for under such conditions the intensity of the beam across its section varies measurably, even over the small angle subtended by the standard chamber diaphragm (19, 20). This effect is minimized when taking off the radiation in the direction normally used in treatment.

Also in the precise calibration of the "Fingerhutkammer," or thimble chamber, such as is used with most dosage meters, some of the factors noted above must be given proper consideration (22, 23). For example, it was definitely established that true obedience of the inverse square law involves exactly the same conditions of diaphragming (20). Hence, in the calibration of a thimble chamber against the standard, the inverse square law must be studied for both, and proper allowance made for the fact that the range of strict adherence in general differs for the two.

Beam uniformity is obviously a necessity also over the area of a thimble chamber undergoing calibration. This uniformity must be verified experimentally in every case, as it is frequently found that a beam which does not contain any off-focus radiation may not have a sufficiently wide uniform region to entirely cover the thimble chamber. Errors of this kind always tend to cause too little ionization to be measured by the thimble chamber.

Except for the Fricke-Glasser "air wall chamber" (21) most thimble chambers have a very pronounced "wall effect," due to secondary X-rays and photo-electrons ejected from the chamber walls, which may produce as much as 15 per cent variation in the ionization currents when used over the voltage range of about 70 to 145 kilovolts with

a 0.5 mm. copper filter in the beam. Over the range of 145 to 200 K.V. the effect is very much less pronounced. While this may not be very serious for medical purposes, it does introduce a complication when using such a thimble chamber for the comparison of two standards.

In the international comparisons by Behnken (15), referred to above, such a thimble chamber was used and a correction for the wall effect was made. However, it is questionable whether all of the other factors were properly considered, inasmuch as they were not well understood at that time. It is thus seen that the method of comparison used by Behnken, while satisfactory at the time, contains many potential sources of error involving corrections which should be entirely avoided, if possible.

With the problem of international comparison in mind, the Bureau is developing a method in which it is hoped that many of these errors and corrections will disappear. It involves a new readily portable type of chamber,[3] which embodies none of the undesirable features of the present small chambers, but is scarcely adaptable to medical dosage measurements.

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[3] A description of this chamber will be published shortly in the Bureau of Standards Journal of Research.

DISCUSSION

DR. G. FAILLA (New York): Without going into the technical details of this paper, it is evident that many difficulties have been encountered in the calibration of X-ray measuring instruments in terms of the international unit called the "r." It seems, however, at the present time that, for practical purposes, most of the serious difficulties can be avoided. I understand, in fact, that the National Bureau of Standards will be in a position to calibrate such instruments soon after the first of the year.

In this connection it might be well to review briefly the historical development of

this work. A unit based on air ionization was suggested long ago by various workers and in particular by Villard—about 1906, if I remember correctly. The Germans, however, who took up this work later, brought the idea to a practical basis and developed suitable instruments. In this country, until recent years there had been little demand for instruments of this sort to be used in the clinic, and very little work on this problem had been done. Dr. Glasser, being familiar with German practice and instruments, has advocated for a number of years the adoption in this country of the units and methods developed in Germany. It was, I believe, largely due to his efforts that the Radiological Society of North America appointed a Standardization Committee to look into this matter and to make recommendations. Through the energetic efforts of Dr. Ernst as chairman of this committee, some funds were made available to the National Bureau of Standards for work of this sort, so that suitable equipment and personnel were provided there about three years ago.

At that time there was no international unit, and considerable difference of opinion existed among those who had set up their own units. The men at the Bureau of Standards very wisely decided that it was necessary to make an independent and thorough investigation of the problem before any practical work on standardization could be undertaken. As a matter of fact, the work that had been done up to that time was very incomplete. Nevertheless, the medical radiologist was led to believe that the problem had been solved and that he should begin to use the unit immediately.

With this setting it may have appeared to some that the Bureau of Standards was delaying unnecessarily the calibration of instruments. Work which has been done within the last few years in this country and abroad, certainly justifies the stand originally taken by the Bureau. The apparent delay has been well worth while, because we know now just what sources of error must be considered. It is perfectly evident that the r-unit is not an absolute unit, as it was thought at first by some investigators, but its magnitude depends on the particular set-up used in its determination. In this country we can all now adopt the particular experimental arrangement used at the Bureau of Standards and thus obtain comparable results in the calibration of instruments.

As for the international unit, its experimental definition awaits a general agreement on certain specifications for the apparatus to be used. The new chamber which Dr. Taylor has described to-day will facilitate greatly the comparison of the unit established in Washington with the units established in European countries.

DR. EDWIN C. ERNST (St. Louis): I think that Dr. Failla has covered very thoroughly the subject of measuring instruments. He is in a position to analyze—probably better than many of us here to-day—the various progressive—and at times questionable—developments in X-ray measurements in relation to the application of a new method or methods of measuring the output of the transformers in use at the present. This presentation of this new or improved measuring device is most interesting and certainly appears to be of practical value.

It is also stimulating to see how careful Mr. Taylor has been, in working at the Bureau of Standards in the interest of the X-ray unit standardization problems, and if new developments do take place in the future or new instruments are perfected or described, I am sure that the Bureau will continue to take advantage of these improved discoveries and fit them in with what we have been doing in the past. The important progress made is that we have a unit stand-

ard for comparison, no matter what new method of measurement we may employ in the future. If any question comes up as to differences of opinion in relation to what is standard, we can refer to our Bureau of Standards for help or correction of the local standard in question. I think it is very fitting that we should realize and give due credit to the very careful, systematic work developed under Mr. Taylor's supervision in the interest of the radiologists of the United States and Canada, and especially the members of the Radiological Society, and we are all deeply indebted to him for these efforts. Therefore, we will continue to give Mr. Taylor and the officials of the Bureau of Standards, Mr. Burgess and others, full co-operation. I am certain that they now realize the value of this new work in Washington at the Bureau of Standards, and also the absolute need for future continued and progressive development in this direction.

DR. J. E. GENDREAU (Montreal): From an historical standpoint, the unit was proposed, before Behnken, by Villard. I agree with what Dr. Failla has said about the construction, at first, of a chamber upon which the others would have to be re-calibrated. This has been done for many other international units. At first, they had a definition which satisfied everyone, but the practical establishment of the unit which was defined, met great difficulty; hence, it was resolved to select one, and to deposit that model or chosen unit at the Bureau International des Poids et Mesures. Other secondary standard units were established from this central unit and utilized in different countries.

DR. TAYLOR (closing): Dr. Ernst just raised a question about which I might say a word, concerning the Bureau of Standards taking advantage of new developments which come up. I think that, so far as we know now, our present method of standardization will probably stand for some time. However, we must always be open to receive anything which is better. Now, if we set up at the Bureau or any other place, a certain standard, arbitrary as it may be, and standardize instruments and record our data and record exactly the results of all our work; and then some other instrument or method of standardization is devised, we have immediately a means of transposing from the old method to the new, all in one set of records, so that the ground need not be covered twice and no time or effort need be wasted.

The other question which was raised by Dr. Gendreau in regard to the deposit of a standard ionization system in the Bureau Internationale at Paris—that question has been raised a number of times. However, the establishment of the X-ray standard unit is not quite the same thing that our standard of length or our standard of weight is. To deposit an X-ray standard in Paris and adopt a single international standard would mean that we would have to set up there an entire X-ray equipment, and have someone trained to operate this equipment—all at a tremendous expense which would be almost impractical. So it seems that, so long as we can get international agreement within, say, 1 per cent, between the three large laboratories at present, and so long as we can get that agreement with our individual equipments, there will probably be no necessity for depositing such a standard at the center at Paris, although in the end such a thing, if possible, is very much to be desired.

DR. J. E. GENDREAU (Montreal): I would like to ask Dr. Taylor if he has tried the Dauvillier chamber.

DR. TAYLOR: I do not have one: I have almost every other kind but that.

ECHINOCOCCIC INVOLVEMENT OF BONE[1]

WITH A CASE REPORT

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In the United States and Canada there are comparatively few cases of echinococcosis in man. Less than 2 per cent of these are found to involve the bones. Because of this rarity few roentgenologists ever see a case and hence do not suspect its presence when one occurs in their practice. As a correct pre-operative diagnosis is of great help in planning the operative procedure and as the roentgenogram can help in the diagnosis, it is important that roentgenologists be able to recognize the condition.

The *Tænia echinococcus* is a small flatworm with two separate stages in its life cycle. As a sexually mature worm it lives in the small intestine of the dog. In man and some animals, such as sheep, cattle, and swine, it passes through the bladder-worm or cyst stage. The *Tænia* eggs are generally believed to enter man by way of the mouth. In the stomach the capsule is dissolved and the small embryo set free. The usual course from here is into the portal vein and thence to the liver. This accounts for the great preponderance of liver cysts. They may get into tributaries of the vena cava or the lymphatics leading to the thoracic duct and thence through the right side of the heart to the lungs. Rarely they get into the general circulation and reach the osseous system, though because the great majority of the embryos are stopped in the capillaries of the liver and lungs the involvement of bones is seldom seen.

The usual development in the liver or lungs results in a single large cyst surrounded by a fibrous capsule. This fibrous capsule is the result of the reaction of the surrounding tissue and one which tends to limit the growth. In bone, on the other hand, no capsule is formed, yet the surrounding tissue is so resistant that the parasite is unable to form a large cyst. The embryo forms a small cyst in the medulla or cancellous tissue, which spreads out in a multilocular form wherever the resistance is lowest. The small secondary sacs divide and form many small cysts, all of which are surrounded by cells that erode the bone and allow them to expand slowly. No new bone is formed in uncomplicated cases, nor is there periosteal reaction, and hence no increase in the size of the bone results. No sequestra are formed, because the sacs spread by direct continuity. There are no separate centers cutting off sections of the bone and there is no subperiosteal spread. There is no hyperostitic osteitis. There is no associated bone atrophy.

As the lesion increases in extent it may erode the cortex and the periosteum. It may rupture through to the skin surface and become secondarily infected, thus complicating the picture by superimposing a chronic osteomyelitis. If the bone becomes sufficiently weakened a pathological fracture results.

Because of these pathological findings one would expect to—and does—find the following changes in the roentgenogram of an uncomplicated bone lesion. The size and outline of the bone is changed very little, if at all. The normal structure of the involved medulla, cancellous region, and cortex is entirely lost and replaced by a series of transparent lacunæ of varying size and irregular

[1]Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2–6, 1929.

shape. No large primary cyst is found. Any portion of the long or flat bones may be involved, from a juxta-articular position to the center of a shaft. There is no atrophy of adjacent bone unless there has been a period of disuse.

It is very doubtful whether in any given case a positive diagnosis of echinococcus involvement of bone can be given without the full clinical history and physical findings. When found in the locations characteristic of benign giant-cell tumor it is readily confused with the latter. The outlines of the cysts are, however, more moth-eaten in appearance and the shaft is not expanded. The trabeculæ are not sharp. The same findings distinguish it from single enchondromatous lesions.

From osteogenic sarcoma of the purely ostéolitic type it may be differentiated by the multilocular appearance, the lack of soft tissue swelling, and the general condition of the patient. Patients with echinococcus involvement are not, as a rule, very sick. The differentiation is much harder when there is a complicating fracture or secondary infection.

Certain localized types of osteitis fibrosa cystica (von Recklinghausen) closely resemble the condition under discussion, but are usually accompanied by a softening and bowing of the bone. The trabeculations are also more sharply defined.

In the pelvic bones and spine it may readily be confused with tuberculosis, especially if secondary infection has set in. There is not, however, the same degree of atrophy of the bones.

CASE REPORT

The case here presented is that of a Greek, male, aged 46, who complained of a "pressure of the lower part of the spine through the rectum." The family history has no bearing. The facts of interest in his personal history are that he lived in Greece till he was 24 years of age and, before leaving that country, had an echinococcus cyst removed from the right side of his abdomen. His present illness commenced fifteen months before admission to the hospital, with pain in the left lumbosacro-iliac region, left hip, and down the left leg. Later he developed a severe pain in his lower back when trying to lift a heavy weight. Progressively he lost control of, and all sensation of, bowel movements, lost control of urination, while the pain extended down both legs and he developed areas of loss of sensation in the perineal region. For about a year his condition had been somewhat stationary and he had spent considerable time in bed.

A physical examination showed subjective and objective findings of involvement of the anterior and posterior roots of the lower sacral nerves. He had normal rectal sphincter tone and a rectal examination caused no such pain as he complained of subjectively. A blood examination on entry (June 14, 1928) showed: Hemoglobin, 80 per cent (Sahli); red blood count 5,230,000; white blood count 10,100; polymorphonuclear neutrophils 50 per cent; large lymphocytes 10 per cent, small lymphocytes 39 per cent, eosinophils 1 per cent.

The roentgenogram indicated a diffuse involvement of the posterior half of the left ilium and left half of the sacrum by a lesion consisting of many small cysts, which appeared as many small calcium-free areas with hazy outlines. The sacro-iliac joint outline was obliterated by the overlying process. There was considerable bone reaction, presumably due to a low grade secondary infection. The diagnosis made with no knowledge of the clinical history was "chronic, low grade infection."

Operative removal of the posterior surface of the fifth lumbar vertebra and all of the sacrum was decided upon, to relieve the

symptoms of pressure on the nerves. This was done on June 21, 1928. The spinal canal was found filled with cysts resembling echinococcus, which appeared to come through from the anterior surface. As

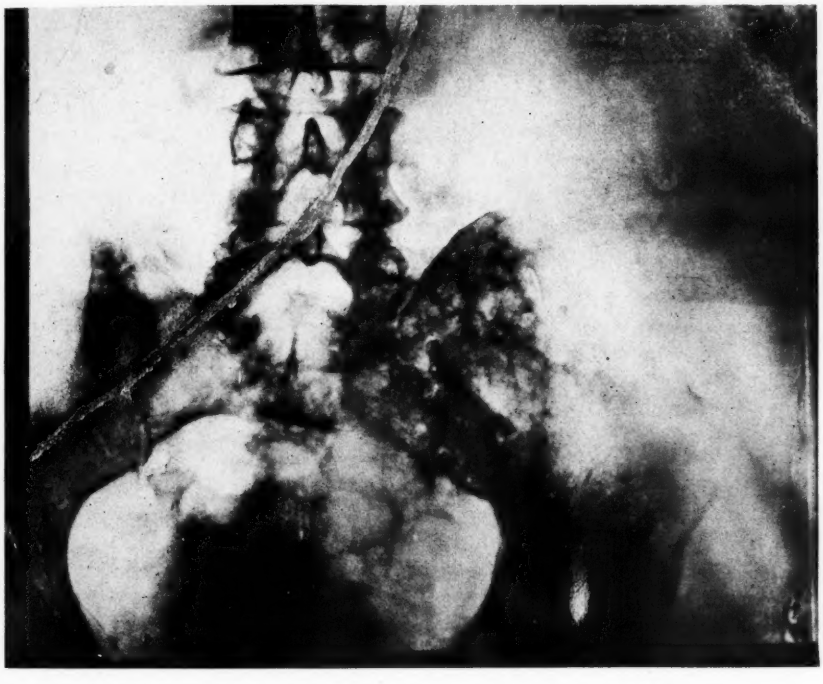

Fig. 1. The changes in the left ilium and sacrum are due to echinococcus cysts.

many of these as possible were removed and the wound closed with drainage.

The laboratory reported that cyst walls and scolices were found typical of echinococcus.

The post-operative course was stormy, due to extra-operative complications. The wound continued to drain. The course was progressively downhill, with occasional severe reactions with chills. The patient signed his own release from the hospital and no follow-up has been obtained.

Probably no man has done more to advance the knowledge of echinococcosis in general and of the bones in particular than Dévé. He obtained his first experimental involvement of bone by injecting fluid containing scolices into the carotid artery of rabbits. By this means he obtained multilocular cysts in the mandible and scapula and single cysts in the soft tissues. His object was to obtain bone lesions not complicated by secondary infection or fracture. Later he induced the formation of a lesion in the tibia by direct inoculation. It is largely on his findings that the pathological description given above is based. There is an apparent discrepancy in his statements, namely, in describing the lesion in the tibia he says that the diameter of the upper two-thirds of the tibia was increased and the surface irregularly bossed, while in another place he says that there is no periosteal reaction or new bone formation.

Walker and Cummins, in reporting a case

of echinococcus involvement of the tibia, reviewed the literature up to the time of their publication and found the following figures: The youngest patient was 1 year old, the oldest 80; males were slightly more frequently attacked than females. A review of the various bone-system distribution statistics would seem to indicate that practically every bone of the body has been involved, the pelvis most frequently, about 35 per cent of all cases; the long tubular bones 43 per cent of all cases, most of them in the femur, humerus, and tibia, the order indicating a decreasing frequency.

Quite recently Claessen published a monograph on the roentgen diagnosis of echinococcus tumors, the greater part of this excellent contribution being concerned with cysts of the liver and lungs. He reports two cases of bone involvement and cites six others, making a total of eight cases in Iceland, or 1 per cent of their total number. An extensive bibliography is included in his thesis.

SUMMARY

Echinococcus involvement of bone starting as a small cyst develops into a multilocular cyst and many small ones. These show as worm-eaten spaces in the roentgenogram.

There is no sequestration, no atrophy, and no increased calcification.

It may involve any portion of any bone, but the pelvis, femur, humerus, and tibia are the commonest sites.

A case is reported, in this instance the ilium and sacrum being involved.

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DISCUSSION

Dr. W. E. Chamberlain (San Francisco): Dr. Stone reports bone involvement in only 1 per cent of the Iceland cases, and since we see relatively few cases of echinococcus disease in this country, we may wait a long time before being in a position to make practical use of the knowledge that Dr. Stone has brought us. However, it seems clear that the X-ray appearance which should suggest this rare condition bears a strong resemblance to other forms of osteitis. The main distinguishing feature would appear to be the extraordinarily thin walls of the cyst-like areas of demineralization.

I would like to ask a question. From Dr. Stone's description it would seem that joint involvement is rather rare, but in the present case, the involvement appears to cross the sacro-iliac joint. Did it really go through into the sacrum?

Dr. Paul C. Hodges (Chicago): Dr. Chamberlain, in discussing Dr. Stone's paper has wondered whether or not he has been overlooking echinococcus cysts in bone. I feel just as he does. I was once located where echinococcus lesions of the abdomen were fairly common, and I have been wondering whether some of our cases of unexplained bone lesion may have been unrecognized echinococcus cyst of bone. What is the situation at operation? Does the surgeon readily recognize the true nature of these lesions when he cuts down upon them, or may he, too, miss their true significance?

I know that surgeons are not always in-

fallible in diagnosing echinococcus cysts in the abdomen. There was once sent to me a man who had been operated on for "echinococcus cyst" of some abdominal organ. Operation had been done and there was an open wound that discharged a thin watery fluid thought to be cyst fluid. I was asked to roentgenograph the patient in the hope of demonstrating calcification in the walls of the cyst. On making the examination, we found quite a collection of dense bodies in the right side of the abdomen, and wondered whether they might represent calcification in cysts. The patient submitted to further operation for removal of the supposed cyst and this time it was found that the true condition was an enormous hydronephrosis. The "cysts" were distended renal calices, the fluid was urine, and the dense bodies were multiple kidney stones.

ECHINOCOCCUS INVOLVEMENT OF THE BONES

REPORT OF A CASE, WITH X-RAY EXAMINATION[1]

By C. K. HSIEH, M.D.

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ECHINOCOCCUS disease of bone is rare, a study of the literature showing that less than 2 per cent of the reported cases of echinococcus disease involved the bones. Reich (1), in 1908, collected from the literature 113 cases of bone involvement; Walker and Cummins (2), in 1917, after a careful survey of the literature, found 88 cases; Corlette (3), in 1920, reported that 18 cases were recorded in Australian publications. Since these reports, eleven scattered cases have been added by Böge (4), Guleke (5), Zorraquin and Merlo Gómez (6), Lesi (7), Costantini (8), Kirchmayr (9), Bell (10), Hines (11), Rocher (12), and Kienböck and Mayer (13). This present case is the only one with involvement of the bones in a series of 16 cases of echinococcus disease studied by Loucks (14), and represents the first case of bone echinococcus recorded in China.

Published data on the roentgenological study of echinococcus involvement of bone are even more scarce, very few of the reported cases with bone lesion having had X-ray examination of the bones. Roentgenological text-books give little attention to the subject; standard works in English, such as those by Baetjer and Waters (15) and Christie (16), make no mention of the disease. Knox (17) and Holmes and Ruggles (18) refer to it in a few brief lines. In a recent article on the radiological diagnosis of hydatid infection by Anderson (19), the bone lesion is not touched upon. Dew (20), however, in his latest monograph on hydatid disease, published in 1928, presents a most comprehensive discussion of roentgenological diagnosis of the lesion in the bones.

CASE REPORT

S. C. S., a Chinese man, 48 years of age, a lacquer worker, was admitted on August 10, 1928, to the surgical service of the Peiping Union Medical College Hospital with a diagnosis of tuberculosis of the right femur and hip joint, his chief complaint being swelling of the right thigh and buttock.

A small, soft, painless, fluctuating swelling in the medial aspect of the right thigh had been noticed by the patient three years earlier. The swelling grew very rapidly, reaching almost its present size in one and one-half years, and spread to encircle the entire circumference of the upper two-thirds of the thigh. It caused no inconvenience other than a feeling of weight of the involved limb. Six months before admission to the hospital two other similar swellings had appeared, one in the right lumbar region and the other in the medial aspect of the right knee region. Five months later the first swelling ruptured spontaneously at the lateral aspect of the middle third of the right thigh, and continued to discharge caseous material copiously. The patient became bedridden on account of pain in the right hip joint and in the region of the symphysis pubis. During the last month he had lost considerable weight.

The man had never been outside the province of Hopei, North China. Besides the usual childhood diseases, he had had no illness with prolonged fever or attacks of di-

[1]This is Case 9 of the series reported by Harold H. Loucks, Department of Surgery, Peiping Union Medical College, Peiping, China.

arrhea. He had had chronic cough and frank hemoptysis twenty years previously. Venereal exposures and diseases were strongly denied. His family history was negative.

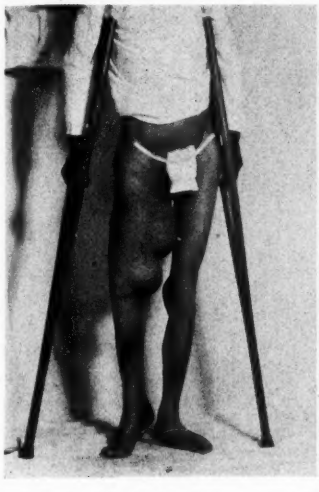

Fig. 1. Marked enlargement of the right thigh with two distinct swellings in the medial aspect.

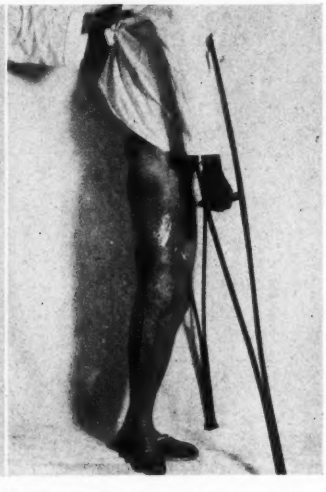

Fig. 2. Note the third swelling in the right gluteal region and the discharging sinuses in the lateral aspect of the thigh.

Physical examination showed the patient to be well developed, but emaciated, and with an anxious expression. Examination of the head and neck was essentially normal. There was no general glandular enlargement. The right lower chest showed poor expansion and appeared to be fuller than the left side. There was slight impairment of resonance over the right apex where the breath sounds were slightly rough. The heart was apparently normal.

The upper portion of the abdomen was full, particularly on the right side. The liver was markedly enlarged, dullness extending from the level of the fifth rib at the mid-clavicular line to 12 cm. below the costal margin. Its edge was irregular and firm. The spleen was pa'pable 5 cm. below the costal margin and was firm.

The right thigh was much enlarged, apparently shorter than the other, and in a position of external rotation. The enlargement was evidently due to two tumors, the upper and larger of which had practically encircled the entire circumference of the thigh. The lower and smaller one was just above the knee in the medial aspect. There was a third tumor in the right gluteal region (Figs. 1 and 2). These three tumors, which did not seem to communicate with one another, were soft, fluctuant, non-tender, and were adherent to the overlying skin. There were three sinuses in the lateral aspect of the thigh, discharging foul yellowish pus. The right thigh was bent medially in the middle. Movements of the right hip joint were free. Definite crepitation could be felt in the crest of the right ilium and in the greater trochanter and shaft of the right femur. In the course of manipulation to elicit crepitation, the patient made no complaint of pain. The measurements of the two lower extremities were as follows:

	Right	Left
Length	71 cm.	81 cm.
Circumference at mid-thigh	60 cm.	32.5 cm.

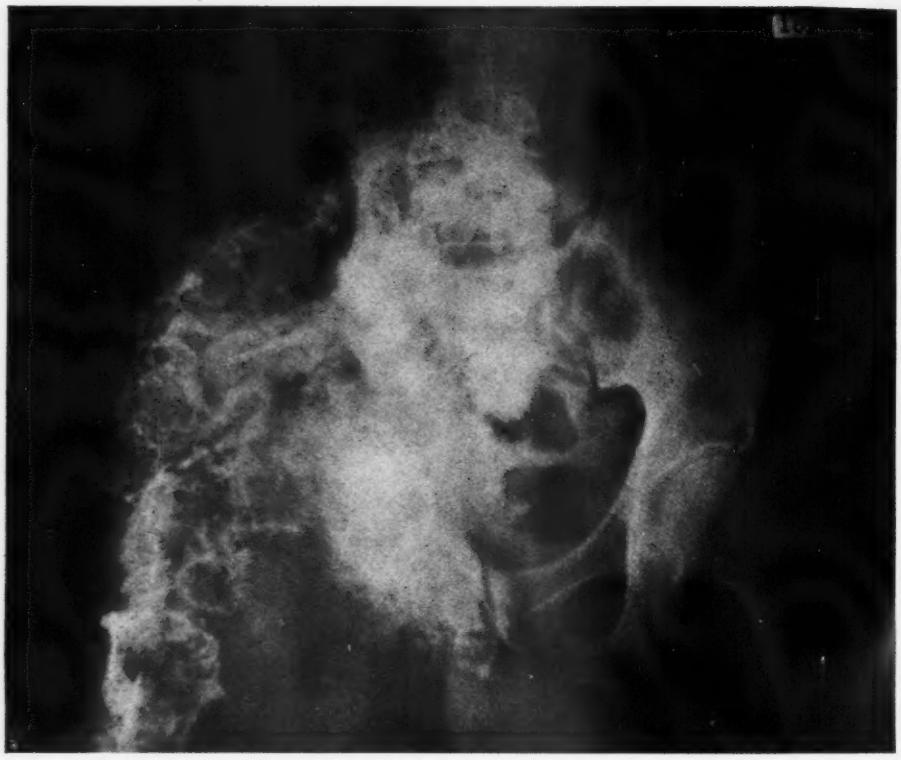

Fig. 3. Roentgenogram showing very extensive cystic destruction of the entire right side of the pelvic bones and the head and neck of the right femur.

Laboratory Findings.—The red blood cell count was 4,500,000, with 85 per cent hemoglobin. The white blood cell count was 10,000, with 92 per cent polymorphonuclears, 7 per cent lymphocytes, and 1 per cent mononuclears. No eosinophilic cells were found. Urine was negative for Bence-Jones bodies on repeated tests. Stool showed only *Ascaris* infestation. Blood Wassermann reaction and culture were both negative. Pus from the discharging sinuses yielded organisms belonging to the *B. coli* group. Smears made from the discharge showed only pus cells and a few bacilli. Temperature varied from 37° C. to 39° C. daily.

One week after admission, after evacuation of much pus, the discharge from the sinuses was noticed to contain occasional cystic and shiny bodies, not unlike grains of rice. No hooklets were found in the discharge. A biopsy of the involved bones and soft tissue showed, among unimportant findings, some homogeneous material which "appeared in the form of short, sometimes thick, laminated fragments or formed irregular structures suggesting collapsed cysts." The diagnosis of echinococcus disease was then made.

The patient went downhill very rapidly after entering the hospital. He developed dysentery in the last week of his life, the organisms responsible being the *B. dysenteriæ* of the mannite fermenting group.

Roentgenological Findings.—Roentgenological examination was made of the pa-

tient on the day of admission and again six days later. The entire right side of the pelvis and the entire right femur except the distal end were very extensively destroyed, leaving no normal bone *in situ*, but a lace-like, hollow framework (Figs. 3 and 4). The bones did not appear to be expanded, except for the upper portion of the blade of the ilium. The cortex of the right femur was much thinned out and was broken through at numerous places. There were also multiple fractures involving the neck, trochanters, and shaft. The right hip joint was apparently not involved, as the joint space appeared well preserved on stereoscopic view. The thigh was enormously enlarged, especially in the medial portion. In the soft tissue of the thigh there were scattered masses of dense material of various sizes, the larger masses being seen in the postero-lateral aspect. The examinations of other bones of the body including the skull,

Fig. 4. Roentgenogram showing extensive cystic destruction and multiple fractures of the right femur and the large soft tissue swelling and scattered dense material in the thigh.

the entire spine, both upper extremities, the left lower extremity, and the right leg, were all negative.

The right cardiophrenic area was occupied by a large, rounded, and sharply demarcated dense mass, extending into the lung field laterally 11 cm. from the mid-line and vertically 6 cm. from the level of the fifth interspace under the scapula into the diaphragmatic shadow. The right dome of the diaphragm was bulging and markedly elevated, situated at the level of the seventh rib beneath the angle of the scapula, being 7 cm.

Fig. 5. Roentgenogram of the chest showing elevation of the diaphragmatic dome, a large, rounded, dense mass in the cardiophrenic area, and parenchymatous infiltration of the apex on the right side and lumpiness of the diaphragmatic dome on the left side.

The fluoroscopic and film study of the chest (Fig. 5) showed a normal left lung field, with lumpy diaphragmatic surface. In the right lung field the first rib circle and the first and second interspace areas had slight parenchymatous infiltration, which was characteristic of chronic tuberculosis.

Fig. 6. Remnants of the fragments of the right femur.

higher than the left dome at full inspiration. Its movement was quite free. The liver was seen to be enlarged below the costal margin.

The interpretation of the roentgenological findings was most difficult, before the true nature of the lesion was revealed. Infection was ruled out because of the extensiveness of bone destruction, the absence of any marked constitutional symptoms, and the freedom from involvement of the hip joint. The soft tissue lesions in the thigh, liver, and chest were not compatible with osteitis fibrosa cystica. Benign neoplasm was discarded on the basis of the marked destruction of the bones, the enlarged liver, and the mass in the chest. Malignant neoplasm of some kind seemed more likely. Metastatic growth in the bones from a primary tumor of the liver or chest, or osteogenic sarcoma with metastasis in the chest and liver was thought of, but the bone lesion seemed too well localized for extensive metastasis. Myeloma was considered more probable than other types of malignant neoplasm, but this by no means fitted in with all the findings. When the clinical and pathological identification of the lesion was established, it was then clear that echinococcus disease easily explained the entire composite roentgenological picture of the case.

Autopsy Findings.—The right ilium, ischium, and femur were found to be mostly necrotic, with broken fragments (Fig. 6) held together by soft tissue, forming numerous cavities of from three to fifteen cen-

timeters in diameter, some of which communicated with the discharging sinuses and the operative wounds. These cavities were lined and filled with dark brown or blackish shreds of tissue and contained necrotic fragments of bone and numerous thin-walled grayish cysts varying from a few millimeters to two or three centimeters in diameter. In one of the cavities of the right femur a large cyst was found, filled with more than a dozen of these thin-walled daughter cysts, each of which was distended with clear fluid. Some of the cavities had grayish, thin walls and were filled with a soft yellowish-gray substance having the consistency and appearance of soft apple pulp. On microscopic examination the bony fragments were found to be necrotic and the myeloid tissue to be replaced either by the hyaline laminated wall of an echinococcus cyst or by granulation tissue. The right pubis was not necrotic but was greatly softened, as also was the medial portion of the left pubic bone.

The diaphragm was pushed up to the level of the third rib on the right side and the third interspace on the left side by large cystic structures in the liver and spleen. The lower border of the liver was 15 cm. below the ensiform cartilage. The diameters were 35, 22, and 13 cm., respectively. There were some six large cysts, chiefly in the right lobe, the largest of which measured $16 \times 16 \times 11$ cm. and occupied the upper portion of the right lobe. From this large cyst two smaller ones, each about 8 cm. in diameter, extended upward. One of these had burrowed through the diaphragm and had become an intrathoracic mass, attached to the inferior surfaces of the middle and lower lobes of the right lung. Cysts were found to have reached the level of the umbilicus—fluctuant, with tough, fibrous walls covered with adhesions. On section, they showed numerous daughter cysts, some of which were collapsed and buried in a thick pasty material, while others were filled with clear fluid and contained scolices. Microscopic examination showed fibrosis under the capsule and in the central space. The cells in the central portion of the lobules showed atrophy of various degrees. The echinococcus cysts were each surrounded by a thick layer of dense hyaline fibrous tissue, which spread irregularly into the liver tissue.

The spleen was greatly enlarged, being $22 \times 12 \times 19$ cm. in size, and because of three cysts of from three to twelve centimeters in diameter reached the level of the umbilicus below. These cysts were fluctuant and had tough, fibrous walls containing calcified masses and covered with fibrous adhesions which bound the spleen firmly to the diaphragm. The splenic tissue was contracted and compressed; the trabeculæ and the capsule were greatly thickened.

The right pleural cavity was partially obliterated by fibrous tissue on the lateral side. The inferior surfaces of the middle and lower lobes of the right lung were attached to the cyst of the liver, which had extended into the pleural cavity through an opening in the diaphragm. The right lung was moderately collapsed in its posterior portion, but its apex and anterior border were distinctly emphysematous. In the apex there was an irregular, firm nodule, which, on section and microscopic study, showed caseous lung tissue. The left lung showed no remarkable findings.

Esophagus, stomach, and small intestine showed no important changes. The large intestine contained numerous ulcers in the mucosa, mostly in the sigmoid colon. The ulcers were superficial and small, but at places they involved the entire mucosa and part of the submucosa. The other organs showed no marked lesions of special interest.

Pathological Diagnoses.—Multiple echinococcus cysts of the liver, spleen, right

femur, and right side of the pelvic bones; rupture of the diaphragm, with extension of the cyst into the right pleural cavity and atelectasis of the right lung; multiple fractures of the right femur and bones of the pelvis, with extension and secondary infection of the cysts into the right thigh; chronic caseous tubercles of the apex of the right lung; healed tuberculosis of the mesenteric lymph nodes, with calcification; acute ulcerative colitis (*B. dysenteriæ*).

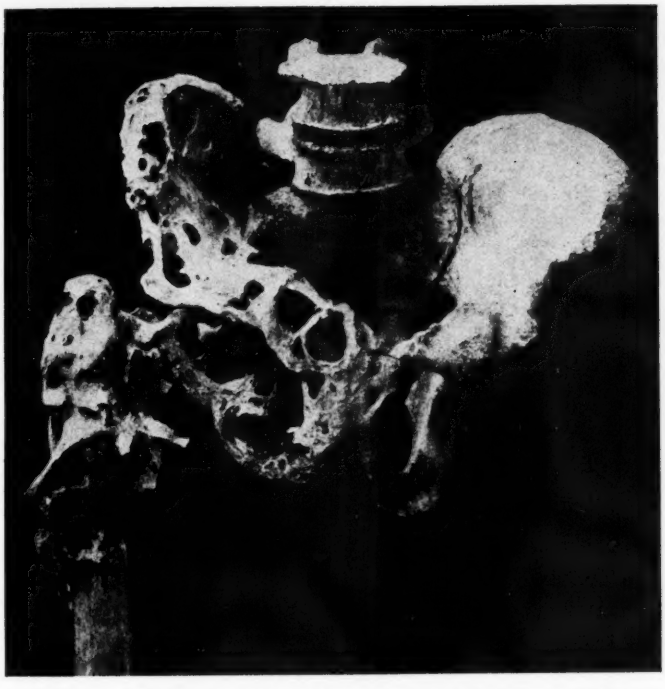

Fig. 7. The specimen of Corlette's case of echinococcus involvement of the pelvis and femur. Compare with Fig. 3 and note the resemblance of the lesion of the two cases.

COMMENT

The clinical picture of this case was puzzling at the beginning. The bizarre roentgenological findings added to the confusion. The diagnosis of echinococcus disease was not made until cysts were demonstrated in the discharge from the sinuses of the thigh.

The difficulty of roentgenological diagnosis of echinococcus disease of the bones is well known, for it is generally recognized that it has no characteristic roentgenological diagnostic features. Among the reported cases the roentgenological diagnosis has been almost invariably wrong, except in the recent case of Kienböck and Mayer (13), in which, however, there was no pathological or serological confirmation. The diagnosis is generally made only after operation or pathological or postmortem examination.

In general, the roentgenological signs of bone echinococcus can be divided into two groups, the early and the advanced. The

early stage is represented by irregular absorption or rarefaction of bone, which is usually taken for osteomyelitis or tuberculosis as in the cases of Harris (21). In the long bones, the involvement is most often met with in the ends of the shaft. The destruction may remain mild and latent for years. The advanced stage presents extensive cystic destruction, with the changes often interpreted as myeloma, osteitis fibrosa cystica, or metastatic neoplasm. The characteristic cystic destruction is well represented by the roentgenograms of the present case (Figs. 3 and 4) and by the specimen of the bony framework (Fig. 7) of Corlette's case (3). Between the two extremes all gradations of destruction may be encountered. Dew (20) emphasizes the absence of subperiosteal thickening and bony reaction as an important diagnostic feature. He also calls attention to the lack of expansion of the bone, the absence of pain, the extremely slow progression, and the age of the patient. The infection often occurs in childhood but generally is not detected until later age, because of its slow development. Pathological fracture is usually present in advanced cases and sometimes occurs early. The pelvis, vertebræ, humerus, tibia, and femur are most often involved, the order of frequency being that in which they are mentioned.

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THE VALUE OF A LATERAL VIEW IN THE DIAGNOSIS OF PREGNANCY[1]

By G. W. GRIER, M.D., F.A.C.P., F.A.C.R., PITTSBURGH, PENNSYLVANIA

NO claim to originality is made in advocating a lateral view in the roentgen diagnosis of pregnancy as this technic has been described in the literature several times already. Rather, I wish to advance the argument that a lateral view is an essential part of this examination, as much as it is in the roentgen examination of an ankle or the lumbar spine. If it is omitted, information which would otherwise be evident will sometimes most certainly be missed, just as it will be if only one exposure is made of a joint. I hope to be able to demonstrate this fact.

Objection may be raised that the unnecessary exposure to X-rays of a pregnant woman is dangerous both to mother and child. This is a statement that appears frequently in the literature. I believe it is applicable only in cases in which the rays are used for therapeutic purposes, or in which many unnecessary exposures are made for diagnostic purposes. The amount of radiation required to make two or three exposures of the abdomen is well below the minimum dosage which would have any injurious biological effect on mother or fetus.

Fig. 1. The relative size of the fetal head and the mother's pelvis is better seen in the antero-posterior or superior view.

As a matter of fact, the X-ray department of the Magee Hospital has made all sorts of roentgen examinations on pregnant women daily for the last ten years, and we have yet to see the first case in which there is any suspicion that such examination has done harm. Included in these are many

[1]Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2–6, 1929.

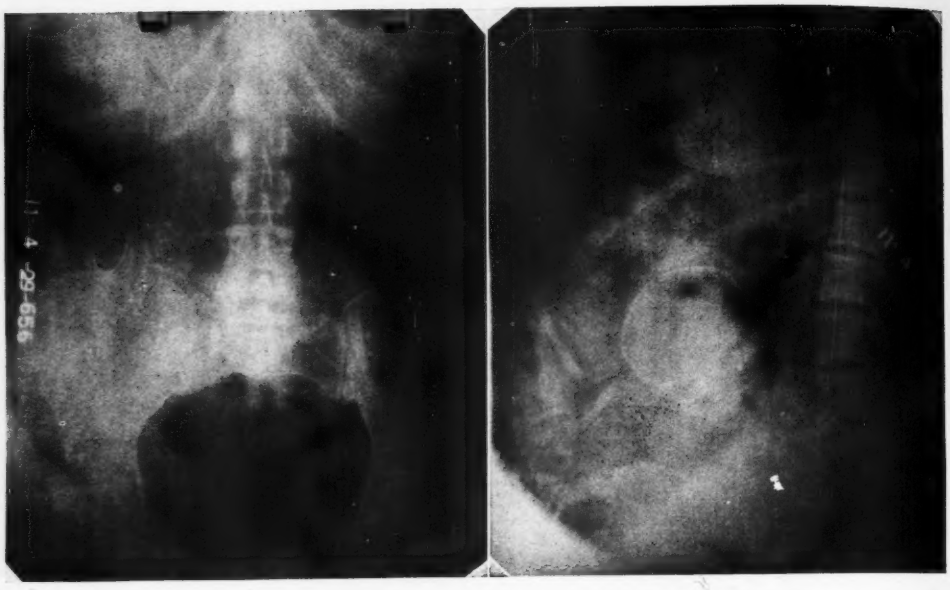

Fig. 2. Twins are usually better demonstrated in the lateral view.

gastro-intestinal examinations, gall-bladder examinations, and pyelograms, in addition to examinations relating to the uterine contents.

Our only unfortunate experience has been in the injection of lipiodol into the uterus for the diagnosis of very early pregnancy. Some of these patients have aborted, but

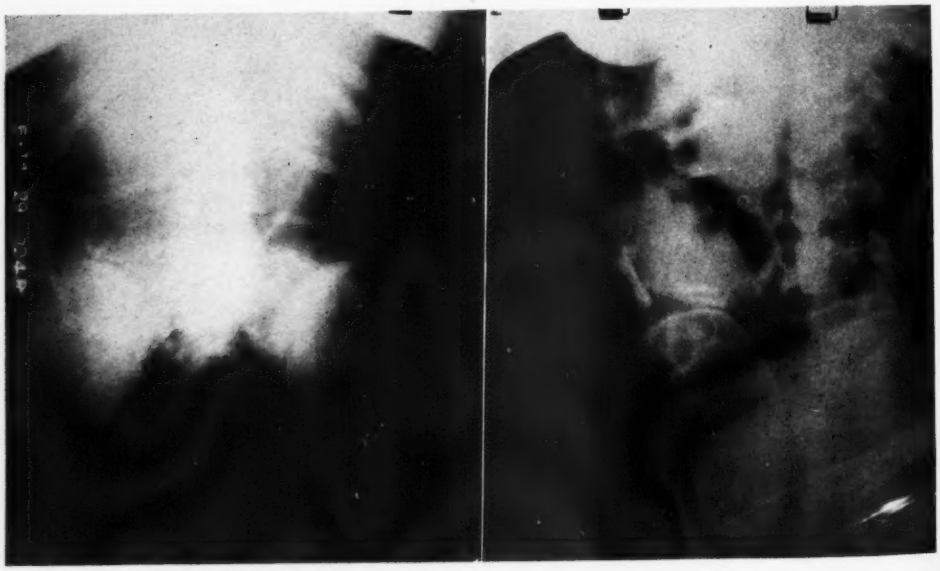

Fig. 3. Macerated fetus. Note disintegration of skeleton.

this outcome was obviously the result of the injection and not due to any X-ray effects.

If the argument is advanced that the injury which results is in the undeveloped ovum of the mother and would be manifest only in case of subsequent pregnancy, we can report several patients who have returned to the hospital one or more times and been delivered of healthy babies since they were first examined by the X-ray. One patient I have in mind has been radiated twice and has been delivered of healthy twins at two subsequent pregnancies.

The advantage of a lateral view is that better detail is obtainable, because there is less tissue for the rays to pass through in this position. In the lateral view, the rays traverse the maternal abdominal wall twice. In the antero-posterior view, they must pass through the abdominal wall and the thick muscles of the back, also the vertebræ. When a pregnant woman lies on her side, the uterus occupies the anterior part of the abdomen, and the total dimension of the tissues to be penetrated is considerably less than when she lies on her back. For these reasons, a clearer image of the fetus is obtainable in this position.

However, in the later months of pregnancy, after the fetal head has dropped into the mother's pelvis, it is not well seen in a lateral view, being obscured by the pelvic bones. As suggested by Shenton, the head shows better in an antero-posterior view, the trunk and extremities in a lateral view. The size of the fetal head in relation to the size of the mother's pelvis is also better demonstrated in the antero-posterior view. A combination of both views is particularly valuable in determining the presentation, size, and exact position of the fetus.

We have found the lateral view of particular value in the recognition of multiple pregnancy. On first thought the detection of twin pregnancy might be considered easy.

Fig. 4. Monster. Note maldevelopment of the skeleton of the trunk.

However, there are several factors which, taken together, sometimes make this procedure very difficult. In the first place, the mother's abdomen is almost always very large and often the amount of amniotic fluid is considerable. If the pregnancy is early, these factors may prevent the demonstration of fetal bones entirely in the anterior view, but they will be well seen in the lateral. We have had this experience many times. In late pregnancy, if, as often happens, one fetus is a head presentation and the other a breech, the two fetal heads will then be lying at extreme opposite ends of the abdominal cavity and a 14×17 plate may be too small to show both heads. Often the other bones may be too faintly outlined to permit the physician to distinguish whether one or two babies are present unless two heads can be seen. The lateral view in these circumstances gives so much better detail of the bodies of the babies that there is no question as to whether it is a single or a multiple pregnancy. We have also had this experience several times.

The recognition of a dead fetus is highly

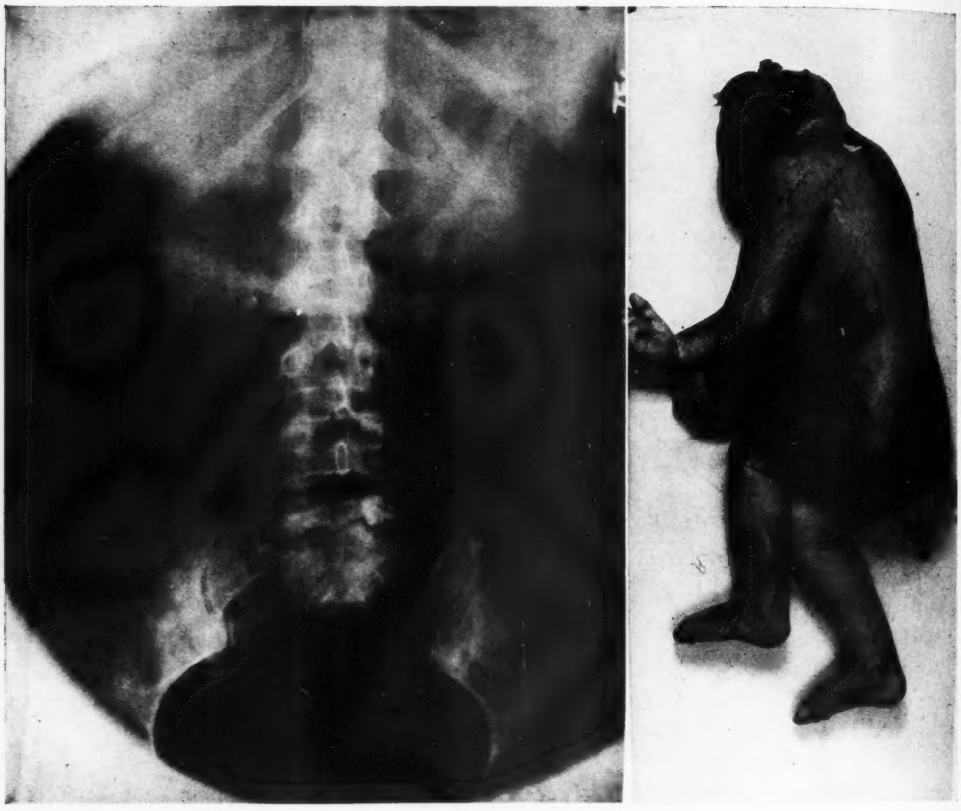

Fig. 5. Anencephalic monster.

important and sometimes very difficult by clinical methods alone. We have occasionally been able to assist in this diagnosis by one of two methods. By repeated examinations, we have been able to demonstrate a lack of increase in the size of the fetus in the course of time. This method, of course, has the marked disadvantage that it requires a considerable lapse of time in order to make a diagnosis. In a few cases we have been able to detect maceration in a dead fetus by disintegration of the skeleton, and in these instances the lateral view has been particularly valuable, as the better detail in this view demonstrated these changes much more plainly. This disintegration is particularly marked in the bones of the skull. Objection has been made that overlapping of the bones of the fetal skull is an unreliable sign of a macerated fetus, because this change may result from molding of the skull to the mother's pelvis. This may be true in late pregnancy, but in the case presented here, the fetus is obviously too small and young for this factor to play any part.

The recognition of monstrous development of the fetus prior to labor is much aided by X-ray examination. For this purpose, both antero-posterior and lateral views are indispensable. In anencephaly we have obtained most information from the antero-posterior view. We have had four cases of this sort which have been recognized before birth. For detection of abnormal development of other parts of the skeleton, the lateral view is particularly valuable. We have had one case in which the vertebræ and bones of the pelvis were entirely absent and

the number of ribs was less than normal. There was also abnormal development of the bones of the skull. These defects were all plainly demonstrated *in utero,* and more particularly in the lateral view.

CONCLUSIONS

1. Both antero-posterior and lateral views are desirable in roentgen examination of the pregnant uterus.

2. This procedure does not subject mother or child to injurious X-ray effects.

3. In early pregnancy and in multiple pregnancy the lateral view is decidedly more reliable than the antero-posterior.

4. For information relating to the fetal head, especially in late pregnancy, the antero-posterior view is better; for information relating to the trunk of the fetus, the lateral view is better.

THE STATUS OF ULTRA-VIOLET RAY THERAPY IN DISEASES OF THE SKIN[1]

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APPROXIMATELY thirty-six years have passed since Finsen first published his early experiments on the physiological action of light, and began the treatment of tuberculosis of the skin by means of the Finsen light, and but sixteen years since Reyn commenced the general carbon arc bath treatment for lupus. Yet, in this period of time an enormous literature has sprung up, to which every year adds its quota. Physiological and pathological experiments tending to show actual body changes have added a scientific basis to the clinical claims made. The physicist, pediatrician, internist, and surgeon all found time for speculation as to the merits of this "duplication" of the sun's rays, and a veritable era of sun-worship was entered upon, not only by the laity, but by the entire medical profession. Immediately the pseudo-scientists, the semi-quacks, and the manufacturers of apparatus—the latter honest in all probability, but with an ax to grind—began to exploit this lucrative field of medicine. Not content with exploiting the medical profession, where they had but a limited field, the manufacturers took their product, namely, the apparatus for generating some type of ultra-violet rays, to the public. Today you cannot pick up any magazine without seeing full-page advertisements lauding the quartz mercury or the carbon arc lamp and quoting and mis-quoting liberally from the writings of known medical men, claiming to produce real miracles.

In view of these facts it seems to me that a careful review of the subject of ultra-violet therapy, its results, its indications and contra-indications, and actual dangers, should be placed before all branches of the medical profession, so that we who should control and mold public medical opinion may do so, rather than leave the control of public opinion to the manufacturers of ultra-violet apparatus. In this symposium others will take up in detail some of the dangers and diseases produced by light and ultra-violet rays, and I will more or less limit this paper to my impressions of the status of ultra-violet therapy in diseases of the skin.

The dermatologist became interested in the ultra-violet ray, first, because of Finsen's remarkable success in the treatment of lupus, and, second, because here might be a method which might supplant the use of messy ointments and give better results in a shorter period of time in a number of the hard-to-treat dermatoses. In a brief time no dermatologist's armamentarium was complete without some form of ultra-violet therapy—Finsen lamps, air-cooled quartz lamps, water-cooled quartz lamps, or one of the whole legion of carbon arc lamps. However, time and experiment soon told the tale, and a great deal of the intense enthusiasm which the method engendered has simmered down to a rationale which can be accepted by honest minds desirous of appraising facts as they are. The electrical measurement of dosage, when used, also permitted the scientific man to judge comparative results with greater accuracy.

In view of the fact that literally thousands of articles on the subject of ultra-violet therapy are written every year, I feel that the digestion of some of this mass of evidence which has accumulated for and against light therapy should be thorough, and that light therapy should be assigned to

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its proper place as a method of treatment in the hands of the dermatologist.

PHYSIOLOGIC ACTION OF ULTRA-VIOLET RAY

A résumé of the opinions of various authors would seem to indicate that the majority of the physiologic effects in light therapy come from the ultra-violet ray, in which the active wave lengths are from 3,800 to 2,000 Å. units, and that this band is further divisible into *near ultra-violet,* from 4,000 to 3,000 Å. units, and *far ultra-violet,* from 3,000 to 2,000 Å. units.

McCaskey, Albert Eidinow, Browning and Russ and others point out that that portion of the ray between 2,800 and 2,000 Å. units has a marked germicidal action, whereas the other portion has a biologic action. The preliminary local effect is an erythema of varying degree, which is followed by pigmentation. Long exposures produce considerable inflammatory reaction and an intense hyperemia, attracting great quantities of blood to the surface, with edema, cellular necrosis, and crust formation. The biologic effect is presumed to be an increase in the percentage of hemoglobin in the blood, a temporary decrease in leukocytes followed by a permanent increase, and a resultant increase of resistance to infection. It is claimed that there is a marked increase in calcium and inorganic phosphate, and recently Malczynski has found that an erythema dose gives an increase in the cholesterin of the blood of from 16 to 30 per cent, which disappears entirely after a period of forty-eight hours. That the ultra-violet ray does possess germicidal activity has been definitely proven by the U. S. Bureau of Standards and the Bureau of Plant Industries, as well as by numerous laboratory experiments on various types of bacteria. I have gone through an enormous quantity of material, and the above facts I found to be reiterated with fair constancy. Pigmentation of the skin produced by ultra-violet light may be an important factor in its biologic action.

ACTION OF ULTRA-VIOLET RAY IN SKIN CONDITIONS

So many are the reports on various conditions treated by ultra-violet ray that I believe less time will be consumed by reviewing the subject under diseases treated.

Lupus Vulgaris.—Finsen and Reyn have shown that local and general light baths with especially constructed carbon arc lamps have produced excellent results in the treatment of lupus, giving 80 per cent of cures. Bizard, Oliver, Butler, W. Jadassohn, and others have spoken favorably of the treatment of lupus vulgaris and other forms of tuberculosis of the skin. Semon and Ormsby, on the other hand, state it as their opinion that lupus cannot be cured by arc lamp irradiation alone, but that doubtless the mountain air and general hygienic measures constitute a large factor in the cure of lupus.

Acne Vulgaris.—Butler states that this form of therapy has produced better results in acne than has any other method; that a mild hyperemia produced by short exposures is of little or no benefit, and that the exposures must be of sufficient duration to produce a severe and painful dermatitis during the first two or three séances. He also states that complicating conditions such as dietary error, anemia, gastro-intestinal disturbances, etc., must be combated. In his rebuttal on the discussion he says: "I will admit that in proper hands, the roentgen rays are more effective than anything else in treating some cases of refractive acne," adding that the ultra-violet ray is less dangerous in the hands of the inexpert. I do not feel that this is a legitimate reason for the use of a method, because a technic can be developed which will be adequate for the treatment of acne by roentgen therapy.

Traub uses a combination of X-ray and

mercury quartz lamp for the treatment of acne, using the ultra-violet ray either alternately with X-ray, or within a week after the last X-ray exposure has been given, stating in his article that, "the use of the mercury quartz may do away with any possible untoward X-ray sequelæ."

MacKee and Andrews have proven that generalized actinotherapy not only does not decrease radiosensitiveness, but that a combination of the ultra-violet ray and roentgen ray is more likely to be followed by a sequela, such as telangiectasia, than the application of the roentgen ray alone.

Septic Conditions.—Chatin, W. F. Castle, J. B. Ellison, A. W. Gregorson, Semon and Ormsby, and others furnish sufficient evidence that infective lesions of the skin, furunculosis, impetigo, septic wounds, and ulcers are very favorably influenced by the use of the ultra-violet ray. This seems logical, inasmuch as both the bactericidal and the stimulative power of the ultra-violet ray are called into effect in these conditions.

J. Becker contests the unfavorable reports of quartz ray treatment in erysipelas and states that he believes it due to insufficient dosage, but I wish to raise the question as to whether the use of erysipelas antitoxin is not the more logical, the more scientific, and the more effective method of treating erysipelas.

Psoriasis.—In psoriasis there is a considerable difference of opinion regarding the response to actinotherapy. Some cases unquestionably clear up under intense ultra-violet therapy, and Goeckerman recommends a combination of crude coal tar and large doses of ultra-violet ray. However, it is a question as to whether the cure is not almost as bad as the disease, and whether the application of such drugs as chrysarobin may not accomplish the result more quickly than the ultra-violet ray. Another rather unpleasant thought is raised by the work of G. M. Findlay, who states that when mice are tarred and exposed to ultra-violet rays the period of time necessary for the induction of cancer is much shorter than when either tar or the ultra-violet ray alone is employed. A series of mice tarred for one month failed to develop cancer, but when exposed to ultra-violet rays for the same period of time, three mice developed malignant growths.

Radiodermatitis and Roentgen Telangiectasia.—Sampson's work, tending to show that the use of ultra-violet ray with, and during, treatment with the X-ray would tend to increase the toleration of the skin to the X-ray has, I believe, been thoroughly disproven.

MacKee and Andrews, in a series of experiments, found the following to be true:

(1) Actinotherapy is of some value in the treatment of chronic ulcers and telangiectasia caused by roentgen ray or radium.

(2) Vigorous actinotherapy, resulting in acute reactions, at or near the time of roentgenization, may enhance the result of the latter.

(3) Tanning of the skin by actinotherapy does not materially increase toleration for roentgen rays or radium.

(4) Preliminary, generalized actinotherapy, even when continued for a long time, does not appear materially to decrease "radiosensitiveness."

(5) It is possible to administer several or many times the standard erythema dose of roentgen rays to a normal human skin without effecting more than a mild visible reaction. Ignorance of this fact may account for the erroneous assumption that actinotherapy is a prophylactic against roentgen-ray and radium injuries.

(6) The authors believe that the ultra-violet ray, regardless of how employed, is of no practical value as a prophylactic against acute or chronic radiodermatitis.

(7) They also believe that a combination of the ultra-violet ray and the roentgen ray is more likely to be followed by sequela,

such as telangiectasia, than the application of the roentgen ray alone.

C. G. Lane states that the effects of the ultra-violet light on the various characteristics of the roentgen telangiectasia and ulcerations is as follows:

(1) The telangiectases are well obliterated near the periphery and in the smaller areas. The larger vessels are not affected, and it is not advisable to increase the time or pressure enough to try to obliterate these.

(2) The atrophy remains the same, but there is definite improvement in the texture of the skin.

(3) The pigmented areas remain unaffected.

(4) The scarring from tuberculous processes is also unaffected.

CERTAIN PRECAUTIONS ARE TO BE REGISTERED

(1) Superficial ulceration, perhaps through low grade infection, can be produced by overdosage. The ulcerations heal slowly and leave a suspicion of malignant change.

(2) Treatments on too many areas, or on areas too near together, are inadvisable at one time.

(3) Cleaning the skin with alcohol or ether will increase the amount of reaction.

(4) Itching may be increased, especially in cold weather, and one must guard against the trauma from scratching and the possible infection of these excoriations.

(5) It is well to avoid areas of dense scarring and pigmentation because of the possibility of causing necrosis in the former and of stirring up melanotic changes in the latter.

Xanthelasma Palpebrarum.—Has been treated with concentrated carbon arc light by Finsen and Lomholt. The light is applied for two hours of irradiation daily, as in the Finsen treatment for lupus. I have been wondering whether this treatment is easier on the patient, or better, than the treatment by electrodesiccation.

Pityriasis Versicolor: Pityriasis Rosea.—Both of these conditions are, unquestionably, benefited by treatment with ultra-violet ray of sufficient intensity to cause desquamation, but here again we can raise the question and point out that pityriasis versicolor is very easily cleared up by the application of a solution of sodium hyposulphite, and that pityriasis rosea is self-limited, and will clear rapidly with any medication that will cause a mild exfoliation.

Alopecia Areata.—In 1920, Fox reported treatment of fifty cases, with twenty-seven cures. Nagelschmidt and Bering, quoted by Fox, treated a considerable number of cases with a large percentage of cures, and in a recent conversation with Dr. Fox, he stated that he still believes this to be the best method of treatment of alopecia areata. The results in our own group of cases were not such as to encourage such optimism. The best results were obtained in young persons who were recent victims of alopecia areata. Those cases that had existed over a considerable period of time proved to be exceedingly refractive to treatment, and we could not help but wonder whether in those cases in which the hair returned, if the hair might not have returned by the use of any type of stimulative treatment.

Nevus Flammeus (Port Wine Mark).—W. A. Clark reported the treatment of a number of cases with a water-cooled quartz lamp, using compression. He claimed excellent results.

Oliver and Fred Wise reported improvement, but not complete cures, using intense vesicating doses.

Butler, on the other hand, stated that he had treated twenty-eight cases of this type of nevus, with only fair results in three of them.

Seborrheic Eczema: Dermatitis Herpetiformis: Herpes Zoster.—So numerous are the articles written on these disease types, and so much at variance are their writers'

views, that an accurate opinion can hardly be drawn as to the values.

Scant attention has been paid in this review to the hyper-enthusiast who lists as the diseases which may be treated by ultra-violet light the following: "Acne (vulgaris and rosacea); keloid; alopecia (especially areata); boils, furunculosis, and carbuncles; chloasma; chancroid; dermatitis venenata; eczema (acute and chronic); erythema; herpes zoster, herpes facialis, herpes labialis, herpes progenitalis, or herpes præputialis; impetigo; lichen planus; Leishman's sore; telangiectasis; lupus; nevus; onychia; pernio; pityriasis; psoriasis; pruritus (ani and vulvæ); rhinophyma; tinea versicolor; urticaria; ulcers; X-ray dermatitis."

Now to turn the mirror and present the other side of the picture. Vechet presented cases of lupus erythematosus disseminatus, in which there was an extension of the disease after exposure to the actinic rays. Other observers caution against their use in this disease.

Colquhoun reported a case which developed multiple keratoses and fixed macular pigmentation as the result of ultra-violet treatment.

S. E. Dore feels that there has been a tendency to exaggerate the result of actinotherapy, and comments on the promiscuous use of ultra-violet therapy in cases which may be very readily treated by simple measures.

Boyd reports a large number of cases that exhibited an irritation of the skin in greater or less degree following ultra-violet irradiation.

Rasch comments on the group of diseases that are aggravated by light, such as rosacea, lupus erythematosus, the groups of senile alterations of the skin, together with those types of cases which are particularly susceptible to sunlight and ultra-violet ray. Arteriosclerotics, syphilitics, and nephritics are particularly sensitive, and in these cases the ultra-violet should not be used except with great caution, because of the intense edema which may take place in the skin. In cases in which there is sensitivity we may get urticaria and hydroa vacciniforme. Patients afflicted wth hyperthyroidism experience an increase of the thyroid syndrome following large doses of ultra-violet.

Marceron divides the harmful results into over-dosage and sensitivity. Pigmentation, more or less permanent, he classifies as a cosmetic defect. Patients who have been placed under radiation daily for periods longer than six weeks become tired, lose weight, and present a lowered resistance. In these cases we get an occasional angioneurotic syndrome. He concludes that accurate diagnosis, positive indications, strict observation of the patient, and accurate dosage are imperative in safe ultra-violet radiation.

SUMMARY

In reviewing the evidence that has been presented it will be readily seen that, as Butler says, "The many physicians stating the merit or demerit of ultra-violet therapy may be conveniently classified in three groups: (1) Those who exaggerate its value by recommending it as a positive cure of numerous skin diseases; (2) Those who unqualifiedly condemn the use of ultra-violet rays, either from little or no experience, or, having accepted the enthusiastic recommendations advocated by Group 1, were disappointed in not finding the rays almost a panacea; (3) Those whose enthusiasm, or pessimism, did not precede their experience; who, having properly applied this energy in selected cases, proved or disproved its value in assisting or establishing cures in certain dermatoses in some instances where other therapeutic measures have failed."

We ardently condemn the first group, sympathize with the second, and align ourselves with the third. The earlier writings were, unquestionably, done by those we could place in Classification 1. The second

group sought print very slightly, or not at all. The third group is the ideal group to be in, and I think that, as time passes, more and more physicians will join this group.

It would seem from the literature that but very few skin diseases can be actually treated with greater benefit by the ultra-violet rays than by other measures. Those which can are the skin tuberculosis group, and the group of septic conditions, including septic wounds and ulcers. In other groups the ultra-violet ray has proven to be either a more or less indifferent agent, or, at best, an adjunct to general treatment.

While it is readily apparent that the use of ultra-violet in proper hands is accompanied by a minimum amount of risk, still there is a rapidly growing amount of evidence which would tend to prove that its use is not as fool-proof as some would have us believe; that it is not an agent which can be put into the hands of the public for indiscriminate treatment of a variety of conditions; and that sooner or later the public will turn upon the medical profession and heap reproaches upon it for not pointing out to them the true status of affairs.

However, in my opinion, any agent that is as valuable as this in two such important groups as have been mentioned, is surely worth keeping and using, but let us not let our enthusiasms carry us away and cause us to recommend this agent as the long awaited panacea for all dermatological ills.

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THE VALUE OF THE CARBON ARC AS A SOURCE OF ULTRA-VIOLET FOR GENERAL IRRADIATION[1]

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IF the therapeutic application of light had reached the stage where all were agreed that certain rays could be selected and successfully applied to treat definite disease conditions, the mechanics of furnishing the light indicated for the purpose might better be left to the advice of the engineer and physicist than the physician.

Workers have agreed about the value of ultra-violet rays for rickets, having demonstrated correlated phenomena both in the laboratory and at the bedside. It has been determined that the band of the spectrum between 2,970 and 2,500 Å.U. is the most potent for activating cholesterol to Vitamin D and in the prevention and cure of rickets. No such harmony prevails in dealing with tuberculosis—the evidence of its value has come from the bedside. The laboratory has been unable to support the claims of the clinicians or to guide them in the treatment.

While the value of heliotherapy and ultra-violet rays is recognized, the clinicians are not in accord; all do not agree upon which part of the ultra-violet region is preferable nor upon the usefulness of infra-red and visible rays. One group, following Rollier, tries to obtain a source which will give light comparable with sunlight in the altitude; a second group, following the Finsen School, bases its treatment upon the use of solid carbons with the short flame carbon arc. A third group uses impregnated carbons with the long flame arc, while others use the mercury vapor arc. These widely divergent means are all offered for the treatment of tuberculosis.

Eidinow (1) has proposed still another scheme for treatment which he terms "short ray therapy." He says that "our present conception of light is mainly based upon the action of the ultra-violet rays." His method is based upon the fact that laboratory experiments show a slow biological effect of the sun's rays between 3,300 and 2,990 Å.U., compared with a rapid effect of the short rays of artificial light between 2,970 and 2,500 Å.U., and that mild erythema doses of these shorter rays increase the bactericidal power of the blood.

He applies a minimal erythema dose to one-sixth of the surface area of the body two or three times a week, allowing an interval of from ten to fourteen days between irradiations of any given area of the skin. Leonard Hill (2) approves of this method and says that there is no point in giving daily exposures of two-hour duration with the powerful short flame arc, as is customary in the Finsen Institute, when five-minute erythema doses of the long flame carbon arc or the mercury vapor arc will yield the desired erythema.

If the method proposed by Eidinow and Hill proves to be effective, it will materially simplify artificial light treatment. It is more likely to further confuse the issue, for it adds another problem for the clinicians to settle.

My experience does not lead me to agree with their point of view. There has been a tendency to over-emphasize the value of ultra-violet rays, particularly the shorter rays and erythema production in the treatment of tuberculosis.

Excellent results have been obtained with heliotherapy in the treatment of extra-pulmonary tuberculosis in our particular cli-

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mate. It might be said that the intensity of the ultra-violet rays is quite inadequate many times during the year. Either the mercury vapor or long flame carbon arcs give a light much richer in ultra-violet than sunlight, yet these lamps, in our hands, were never able adequately to replace sunlight until an attempt was made to simulate some of the elements of heliotherapy.

Because the laboratory has been able to ascertain certain biological effects from ultra-violet rays, it should not be assumed that they are the only ones which are biologically active. With the meager laboratory evidence we have, it is too early to hold that the rays from this one section of the spectrum are sufficient in themselves for all disease conditions, particularly when clinical evidence points to the value of infra-red and visible rays.

Franz Nagelschmidt (3) has said that, "It was not necessary to rely merely upon the ultra-violet light. The whole of Nature was the product of adaptation not only to ultra-violet, and it is possible that the other parts of the visible spectrum, even of infra-red, were just as important as the ultra-violet." And Leonard Hill (4) has said that, personally, he believed cold air, toning up the body, was as important as light; so far as tuberculosis was concerned, more important. Good results would not be achieved by merely having ultra-violet lamps indoors; that must be combined with exposure of the skin to the open air.

Although the laboratory eventually may be able to define the beneficial action of certain rays, it is unlikely that the treatment of tuberculosis will ever be confined to one region of the spectrum.

In estimating the value of light for the treatment of tuberculosis, it is difficult to separate its effects from the effects of the other factors of the cure. Natural and acquired resistance, local and constitutional rest, proper food, and fresh air are recognized factors in the cure of the disease. Their relative worth cannot be estimated any more than can that of light.

The statistics offered by the various proponents of the widely divergent methods of using light give no clue to their value, for they all claim equally favorable results. An analysis of the results in the treatment of our children with the different types of light discloses no additional information and tends to support claims of the various proponents. The effect of light upon the length of stay, the gain in weight, or change in hemoglobin, etc., cannot be gathered from the table, because so many factors enter into the results obtained.

The length of stay depends, to a certain extent, upon the severity of the lesion, for it is our practice to keep the patient until he recovers or is found to be incurable. The gain in weight is due more to the condition of the patient, his age, and growth than to the effect of light. The increase of the hemoglobin is due to low percentages upon the patient's admission. The figures here given are only for those who were definitely anemic. Fifty per cent of these children had correctable physical defects other than tuberculosis, the correction of which defects alone was a definite factor in recovery.

It should be remembered that tuberculosis is a chronic disease and tends to recover under favorable circumstances. Untreated or poorly treated lesions of extra-pulmonary tuberculosis may last for years, causing chronic invalidism, partially or completely disabling the patient from work. The most miraculous changes are seen in these cases in which, all other elements having been tried but to meet failure, the application of light seems to give them the "boost" necessary to achieve the cure. The application of light, together with the other elements, saves the patient from chronic invalidism and often prevents recurrence of the disease.

Light has no value if used by itself, but it is a wonderful instrument of healing when combined with the other essential fac-

TABLE I

STATISTICAL TABLE OF RESULTS IN 220 CHILDREN WHO WERE TREATED WITH VARIOUS TYPES OF LIGHT IN ADDITION TO REGULAR SANATORIUM REGIME

	Carbon Arc	Per cent	Sun and Carbon Arc	Per cent	Sun and Mercury Vapor Lamp	Per cent	Sun	Per cent	Total	Per cent
Average hours sun			550.3		595		352.6			
Average hours lamp	313		216		195					
Average length of stay—months	8.6		21.3		15		6.2			
Average age—years	8.3		7.4		8.8		10.3			
Average gain—pounds	9		11.3		11.3		10.8			
Average gain per month—pounds	1.5		.53		.75		1.7			
Average gain hemoglobin—per cent		21		26		26		23		
Died	1	1.5	1	1.9	1	1.2			3	1.3
Unimproved					1	1.2			1	1.2
Improved	1	1.5	1	1.9	2	2.5	1	4.5	5	2.2
Quiescent	11	16	7	13	16	20	11	50	45	20.8
Apparently arrested or arrested	53	80.3	44	83	59	74.3	10	45.5	166	75.4
Total	66		53		79		22		220	
Number having correctable physical defects		50		43		68		38		

tors and when it is applied with the art of a trained and experienced physician. In this regard it might be said to act in the nature of a catalyzer, *i.e.*, it acts in the presence of the other factors and accelerates or "boosts" their reaction. Light is a pliable agent. The different forms of light obtained from the various sources may all be used to good advantage: the problem is to know their uses and limitations.

When asked which type of lamp he preferred for general irradiation, Sir Henry Gauvain said that he found all types useful. This agrees to a certain extent with our experience. The majority of our patients are treated with heliotherapy. The long flame carbon arc is used, if possible, on the dark days. Those patients who, for some reason, are intolerant to the strong infra-red or visible rays,—patients who have tuberculous enteritis or whose vitality is low,—are treated with the mercury vapor arc.

The type of lamp, then, which one would select to furnish ultra-violet rays for general irradiation depends to a considerable extent upon the clinical aims of the physician and the type of case offered for treatment. The preponderance of infra-red and visible rays which will aid in softening a caseating node, in some instances might act as a menace and in others have a salutary effect. A tan similar to that produced by the sun, the desire of most heliotherapists, may be obtained with light from the carbon arc by filtering out the shorter rays. When it is advantageous to have a minimum of infra-red and visible rays and a maximum of ultra-violet, and when the shorter rays below 2,950 Å.U. are not objectionable, the mercury vapor arc admirably meets the situation. It would not be expedient to attempt to filter the longer rays from the light of the carbon arc.

If the "short ray therapy" proposed by Eidinow is followed, the mercury vapor arc will produce the desired erythema at a cost below that of the carbon arc, but if, as he also suggests, the light is supplemented by a battery of incandescent bulbs to augment the infra-red and visible rays, the carbon arc is the more expedient. When the whole spectrum is desirable in the distribution and relative intensities of sunlight, as is the case with 80 per cent of patients with tubercu-

losis, or for the greater majority of cases of rickets, or skin diseases, or for a tonic bath, we find the carbon arc preferable.

The carbon arc is particularly suited for use as a substitute for heliotherapy in dark weather, and it answers the varied requirements for the present-day practice of actinotherapy better than any other single type of lamp, since it can be adapted to meet a wide range of conditions. If the leads are sufficient in size, a lamp with a proper mechanism can be made to take anywhere from 15 to 90 amperes merely by changing the sizes or types of carbons and carbon holders and by adjusting the resistance. Thus may be produced a wide range of intensities, delivered by no other artificial means.

Solid carbons and the short arc may be employed, as advocated by the Finsen School, or impregnated carbons and the long flame arc, as is the custom in this country and England. With properly impregnated carbons its light may be made to have a maximum of ultra-violet, or infra-red, or to have a continuous spectrum somewhat analogous to that of the sunlight.

There are some differences in the intensities of spectral distribution between alternating and direct current and in the latter when the positive pole is above or below (5).

The carbon arc is particularly suitable for installation in the physical therapy units of institutions, where single lamps with twin arcs for individual treatment or clusters of arcs for group treatment may be set up to give any type of light desired.

The fact that gases given off during the combustion of the carbons make necessary proper ventilation enhances rather than detracts from their value, for thus is insured the presence of a constant supply of moving fresh air during the treatment, and also the removal of the heat radiated from the reflector. Unless adequate ventilation is provided, an excessive amount of heat is built up and the bath becomes exhausting and depressing rather than stimulating and refreshing. The mercury vapor arc likewise requires ventilation, the gases generated during the burning of the arc being irritating to sensitive throats.

Other than the abundance of infra-red and visible rays in its light, there are few disadvantages to the carbon arc. The ordinary lamp of 15 to 25 amperes needs heavier wire leads than is found in the ordinary lighting circuit, and there is a hazard from the open flame and sparks of fusing metal thrown off in the adjustment of the arc. These disadvantages, however, are minor in character. If it is necessary to use the ordinary lighting circuit, a low amperage lamp burning at six to eight amperes may be used, and the difference in quantity can be made up by longer exposures and a closer proximity of the lamp to the patient. The hazard of the open flame and sparks can be lessened by using either a wire meshed screen or a filter of one of the transmission glasses. When either the carbon arc or mercury vapor arc is used in the home or office and is not under the constant supervision of a trained attendant, it is wise to use a filter to give a greater factor of safety.

There are many excellent makes of carbon arcs on the market. Some are more troublesome and expensive to operate than others. A lamp should be selected which is simple in its mechanism, steady in its operation, and economical in its use of current. For our particular clinical aim, which is to replace heliotherapy on dark days, we have selected a lamp with a vertical feed, operated by a solenoid requiring 15 volts for the adjustment of the arc, the line current being 110 volts direct current. For individual treatment a twin arc, connected in series, carbons 30 inches apart, positive carbon above, and consuming 20 to 25 amperes, is used. Where higher amperages are necessary, the current not required for the sole-

noid is shunted through the arc. Therapeutic "A" carbons are used. The metal reflector is surrounded by a hood which has a central vent and an exhaust fan to pull out the radiated heat and gases. The light is filtered through one of the transmission glasses, which cuts out the rays below 2,900 Å.U., and protects the patient from the sparks of fusing metal. The separation of the carbons gives a good distribution of light over the body surface.

We have devised a unit for group treatment, a description of which appears on page 127 in the "Transactions of the Twenty-fourth Annual Meeting of the National Tuberculosis Association" (Portland, Oregon, 1928). Two twin arcs with their carbons 11 inches apart are placed in a 12-foot horizontal hood, each arc consuming 45 amperes. An adequate means of ventilation is provided.

With this unit—

Sixty children may be treated at one time.

The patient is twelve feet from the arc.

Gaseous products of combustion and fusing metal sparks are not troublesome.

A gentle current of fresh air moves over the body of the patient.

The temperature of the bath may be regulated.

Cocoa butter inunctions are given to act as a partial filter for the shorter rays.

There is a sufficient quantity of infra-red and visible rays.

There is an even distribution of light over the body surface.

The exposure period approximates that usually given to heliotherapy.

Fifteen minutes produces a slight erythema.

By gradual exposure and cocoa butter inunctions a good tan may be obtained, which simulates in character that obtained from the sun.

It is simple to operate.

It costs less per patient treatment than any unit with which the writer is familiar.

Over 100,000 exposures have been given to children without producing evidence of conjunctivitis.

The problem of light treatment is by no means a settled one. This unit is an attempt to settle our own particular problem and is still in the experimental stage—it will require several years to determine its true value: it might be changed or abandoned altogether as our knowledge progresses. At the present time it answers our purpose better than any with which I am familiar.

Lamps should not be purchased or units set up because others have found them clinically useful. It is very easy to be led astray by false interpretation of the factors which enter into the results of treatment.

After a careful study of the subject from all sources and an inventory of the type of lesions which will be presented for treatment, be guided by your own clinical aims in the selection of lamps for general irradiation.

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REPORT OF SIX CASES OF MALIGNANT MELANOMA TREATED WITH X-RADIATION, WITH TWO CASES CURED FOR OVER FIVE YEARS[1]

By H. B. McEUEN, M.D., JACKSONVILLE, FLORIDA

MY excuse for presenting these few cases before this Society is that practically all text-books on this condition begin by a description which usually reads, "This is the most malignant of the sarcomata" (1), and terminate as to prognosis and treatment by suggesting wide excision, laying great stress upon the fact that malignant melanoma is almost invariably fatal.

I have a statement from one of our best surgical authorities which supports the foregoing text-book treatment and prognosis, in which he states: "In the past thirty years we have operated upon at least two hundred malignant melanomas, with only one five-year cure" (2). In some correspondence with this surgeon he mentioned the fact that this case had had some post-operative X-radiation, and, in reality, I fully believe that X-ray therapy really produced this one cure for him over a five-year period.

So with a surgical mortality of 100 per cent in treatment of malignant melanoma, and with a five-year cure of 33 per cent by X-radiation, I felt it my duty to report these cases. I do not propose to go into a lengthy academic discussion as to where this tumor derives its coloring matter, melanin, nor from what layer of the primitive embryo it arises, nor any histologic descriptive dissertation on the subject. To those interested in these phases of the matter I would recommend that they read an article in *Surgical Clinics of North America* (April, 1926) by Edgar L. Gilcreest, as this article gives a plausible explanation as to the origin of the malignant melanoma. So without further ado the six cases, with a fairly detailed description of the history and treatment pertaining only to the disease under consideration, will be presented.

Case 1. Mr. C., aged 60 years, sent to me in May, 1923, for radiation of a small black tumor of the skin, located one-half inch posterior to the external canthus of the left eye. This was quite an insignificant looking growth, but I can assure you that in the case of one patient who died, the primary growth was even more insignificant in appearance. The patient stated that this tumor had been on his face for a number of years and had given no trouble until two weeks previously, when it had received a bump. From that time on it had grown rapidly, increasing to twice its original size in two weeks' time. It had also begun to ulcerate, associated with slight pain and a slight serous discharge without scab formation. This tumor, along with a margin of healthy skin, was given a caustic dose of X-ray, 120 K.V., 60 milliampere-minutes, unfiltered, at approximately 10-inch T.S.D., and at the end of two months it had healed completely, with no evidence of pigmentation remaining. This patient was heard from in June of this year [1929], and has remained well.

Case 2. Mr. B., aged nearly 40 years, was referred to me in May, 1924. He had a growth in the submaxillary region the size of a large English walnut. This had been present for a number of years and had given no pain nor shown any signs of growth, but the man decided to have it removed surgically for cosmetic reasons. The surgeon who removed it stated to me that he was unable to tell that the growth was a melanoma until he had cut down on it, as it was one-half inch below the skin surface, and by the time he had found its true nature

[1]Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2–6, 1929.

he had traumatized it considerably, so attempted to completely remove it and thought that he had succeeded. A section was obtained, on which he had received a telegraphic report from a pathologist, and he presented me with this telegram and the patient at the same time.

Two weeks after removal the growth had recurred at the original site and to the original size, associated with practically no pain. The patient was immediately started upon very heavy X-radiation, covering the neck and head up to the level of the external auditory meatus, treating this area with the following technic: 130 per cent E.S.D. from 200 K.V. tube, ¾ mm. Cu, and 1 mm. Al as filters, and from a number of ports of entry. The entire dose was given in six days. At the end of two weeks the patient was given treatment with the following technic: 120 K.V., 75 ma.-min. 4.5 mm. Al filters, 22 cm. T.S.D. through a 10-cm. port of entry directly over the tumor mass. Within three days there was violent erythema in this area, associated with an extreme degree of swelling in the soft tissues of the mouth and throat, rendering it impossible for the patient to swallow. This lasted for four days, and I had begun to think that my "cure" was going to end fatally from gross slough of the tissues of the throat and mouth. Ice water, trickled into the mouth, and ice bags to the neck constituted about the only treatment I could suggest to palliate this condition, and this did afford some relief. After four days of torture the edema and reaction subsided somewhat and along with it went the tumor mass. To this day the patient has not had further radiation and has remained well.

Case 3. Mr. W. G., aged 70 years, came for treatment June 1, 1929. The patient, when presenting himself for treatment, gave the following history: Duration of growth, one year. Started as a mole or blackhead. A barber picked and squeezed this, thinking it was a buried hair in the skin, and got out only a thin watery discharge. From this time on it grew rapidly. It had been removed with arsenic paste on an average of at least once each two months, each time leaving a small black area at the base of the resulting slough which immediately took on new growth or continued to grow. At the time he came for treatment there was a nodule which appeared to be just below the horny layer of the skin, with the skin thinned out and giving the appearance of being drawn tightly across a tumor mass. Through this thin skin the tumor could be seen to be black. This main nodule, which appeared to be 3 cm. in diameter, was attached to a larger mass below, which extended posteriorly nearly to the external auditory meatus and for a slight distance below the lobe of the ear. Together, they were movable with the skin, and not attached to the deeper structures. The area was given the following X-radiation: 120 K.V., 22 cm. T.S.D., 55 ma.-min., unfiltered, and, in addition to this, 30 ma.-min. with the same factors, through 4.5 mm. Al, taking in only the diseased area with the unfiltered and with the filtered the diseased area and also an area extending well down on the neck. Four months later the entire tumor mass had disappeared. There is at present a slight area of pigmentation in the resulting scar, not over ½ cm. in diameter, and with no sign of tumor formation present.

Case 4. Mr. McL., aged 50 years, appeared in good health on January 15, 1922, when a surgeon brought him to me for radiation of a small tumor on the plantar surface of the right foot. The following history was given: Two months previously the patient had consulted him for the removal of a small black tumor, approximately 3 mm. in diameter, which appeared to be just under the horny layer of the skin. Considering it a relatively simple matter, the surgeon had removed it by elliptical incision under a local anesthetic. In just three weeks' time the tumor had returned to its

original size, alongside of the incision. It was again removed by a like procedure, with very prompt return. Then the patient was sent to New Orleans, to a prominent surgeon there, who likewise removed the tumor by the knife route, with its equally prompt return, except that on this occasion there were two tumors instead of one, one on each side of the incision.

After three failures by surgery, it was decided, as usual, to try radiation. On examination, the two tumors appeared approximately 4 mm. in diameter, jet black, and within the skin. No glands were palpable in the leg or groin. X-radiation given on this date was: 120 K.V., 10-in. T.S.D., 75 ma.-min., unfiltered, which I consider a caustic dose. This was given over the small tumors and to an area of one inch of the surrounding tissue. At the end of three weeks the tumors showed no increase in size, nor were there any additional ones present. The skin in this area, along with the tumor masses, was easily stripped off, as on an old blister; this stripping off of the skin and tumor mass extended down into the subcutaneous tissue, with no sign of tumor masses diminishing in diameter. I felt that there was no hope from further radiation and advised hip joint amputation. This advice was taken after postponing it for two months. Melanoma metastasis was found in the glands of the groin at this time and the patient died two months later from generalized metastasis.

Case 5. Mrs. D., 20 years of age, the wife of a poor farm superintendent, came for examination through acquaintance with an inmate of the farm who had had an epithelioma on the wing of the nose treated, stating that on the first sign of growth she had immediately come for advice. This was in June, 1924. She gave the following history: There had been, as long as she could remember, three large, flat, jet black masses in the skin, protruding slightly above the skin level of the right breast. There had never been any pain nor had they shown any sign of growth until after childbirth two months previously. During the past three or four weeks she had noticed that the skin growths had begun to enlarge and that she could feel lumps in the breast. These latter she had thought were caused by clotted milk, and she had applied hot applications and had the breast massaged: also, the baby had nursed from this breast all along. The massaging and hot applications appeared only to increase the number of lumps and to make the skin tumors enlarge. Her husband was advised as to the serious nature of the tumor and gave me permission to go as far as I liked in the matter of treatment. I immediately began a series of deep X-ray therapy, giving the entire right chest and breast as well as the supraclavicular space approximately 130 per cent of the E.S.D. from 200 K.V. at 60 cm. T.S.D., through ¾ mm. Cu plus 1 mm. Al filters, from a number of ports of entry. This treatment, diminished to approximately 80 per cent E.S.D., was repeated in three weeks, causing a rather marked erythema. In two weeks from this last dose there was noted a diminution in size of the skin lesions, the growths appeared to be contracting and leaving a perfectly white skin between the jet black growths and the brown of the erythema, this white skin completely encircling the growths and measuring six to seven mm. in width. At this time I could not determine from palpation whether or not the deep masses had regressed to any extent. Thinking, however, that it might be an advantage to have the breast removed, in view of the fact that the skin lesions had regressed somewhat, and hoping that radiation had caused enough fibrosis to prevent or block metastasis, and that it would be easier to radiate to prevent recurrence after the breast had been removed, I had this done, much to my sorrow. The breast after removal showed throughout on section masses tarry black in color, putty-like in

consistency, which varied from pin-point size to one inch in diameter, with so little stroma supporting the interior of them that they could be spread out like putty.

There was very prompt recurrence (less than two weeks after operation) of the skin lesions alongside the incision, before union had taken place. These were in the form of a number of jet black masses, approximately 4 mm. in diameter. On these I tried any number of factors, with filters and without, but to no avail. The patient died two months after the operation from generalized metastasis.

Case 6. N., a boy, aged 15 years, was operated upon for tumor on the right side of the neck in June, 1923, one month before being sent to me for radiation therapy. The surgeon reported that the tumor consisted of a dense black mass of soft tarry consistency, and that he had removed all that he could. He had not had a section done on it. The tumor showed signs of recurrence in ten days' time. Upon examination, one month after the operation, the tumor mass was quite large and nodular and was forcing the patient's head over to the left side; also, there was considerable pain and difficulty in breathing, the latter due to pressure. There had been no evidence of pigmentation of the skin, either before operation or subsequently. The patient was given 130 per cent E.S.D. from 200 K.V. tube, covering the neck completely. The entire dose was given in four days and through three ports of entry. Reports from this patient one month later were very encouraging, stating that the tumor mass had completely receded and that the boy appeared to be all right. Within the second month the mother came to see me about some mental symptoms the boy had developed, thinking that radiation had probably caused them. This, I was able to convince her, was not the case, but was due to metastasis to the brain. I did not attempt to radiate the skull, and in three weeks from the onset of the brain symptoms the boy died. From the time of the regression of the tumor in the neck until death, there was no sign of recurrence in the neck.

SUMMARY

(1) Surgery on malignant melanoma should be discontinued, as surgery alone gives a mortality of 100 per cent.

(2) X-radiation is the treatment of choice and must be given in very radical dosage, with an attempt at giving the maximum dose within as few days as possible.

(3) If the lesion is in the skin, radiation from a tube excited by 120 K.V. is recommended, with probable filtration of 0.5 mm. Al, to prevent marked skin damage from the excessive dose.

(4) If the lesion is at a depth below the skin, as in the submaxillary case reported, radiation had best be given from a tube excited at from 200 to 220 K.V., with Cu and Al filtration, the maximum dose to be given just under one that would cause permanent damage to the surrounding tissues, that is, a dose approximating 130 per cent E.S.D., administered through a number of ports of entry.

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SPONTANEOUS PNEUMOPERITONEUM IN RUPTURED PEPTIC ULCER[1]

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THE value of air beneath the domes of the diaphragm has long been recognized as an aid to diagnosis. When air has been introduced into the peritoneal cavity by the rupture of a hollow viscus, it is of considerable importance to the surgeon, but does not necessarily mean immediate operation. Geier (1) states, citing McCrury, that 60 per cent of perforated ulcers operated upon within from twelve to twenty-four hours show a mortality of 60 per cent, and a mortality of 100 per cent if operation has been delayed over forty-eight hours.

Vaughan and Singer (2) reported 72 of these cases in a recent article, nine of which had free air in the peritoneal cavity, with definite history of ulcer. Since then, we have been able to add six more cases, representing those that had mild perforations and only slight evidence of peritonitis.

It is our opinion that there are a few ruptured peptic ulcers that can be treated successfully by medical management. The reason for these cases aborting is that a small pinpoint opening is present but closed over with fibrin before sufficient material has escaped from the stomach to cause peritonitis. Singer (3) has explained the pathology in these cases by stating that (1) the perforation is small and closes over with fibrin, or that (2) adjacent viscera come in contact with the opening very early, or possibly (3) a small particle of food has closed the opening. Moynihan gives as causes of restricted leakage: (1) Empty stomach; (2) the presence of layers of protective exudate which are laid down as the ulcer deepens so that when the final dissolution of the wall occurs there is already a barrier; (3) plugging of the perforation with omentum. In this type of case the diagnosis based on history and physical findings is not as complete as it might be; however, if free air is demonstrated in the peritoneal cavity, the diagnosis is more evident and proven. We feel that the case is as much proven by this method as is that of a mass in the pylorus of a stomach which is stated by the examining surgeon to be non-malignant. He has added no more real information to the case than if he had not operated.

The technic is essentially that of a quick fluoroscopic examination. The usual hospital cart can be wheeled in front of the vertical fluoroscope and the patient asked to sit up, leaning against the upright. A quick glance will show the presence of air beneath the diaphragm. On the left side, it should not be confused with air in the stomach or splenic flexure of the colon. The patient should then lie on the left side to be examined, since adhesions may not allow air to separate the liver and diaphragm.

Pendergrass and Kirk (4) have suggested that the patient be observed in the lateral view for encapsulated air. We also find this of value. If films are taken we do not use this view, since it is too difficult for the patient. If no air is present, we have the patient lie on the left side for a few minutes so that the fluid will go to the fundus and the air to the pylorus of the stomach. A film can also be taken by wheeling the cart in front of the chest plate changer, and having the patient sit on the side of the cart. The ordinary chest technic is used except that the tube is centered about the level of the diaphragm, to prevent the oblique rays from obliterating a small amount of air and also to make the diaphragm line sharp. If air is found below the liver, then the poste-

[1]Read before the Radiological Society of North America at the Fifteenth Annual Meeting, at Toronto, Dec. 2–6, 1929.

ro-anterior chest is taken with the patient lying on the left side.

In a well regulated department there should be very little time consumed in taking the films and no danger to the patient. We use the same consideration for the charity case as we would for the private case. The time consumed in such an examination is about five minutes, the patient merely stopping in the X-ray department on the way to the operating room. The average operating room "set up" takes at least twenty minutes for an emergency, consequently there is no delay to this examination. In spite of the fact that many have free fluid in the peritoneal cavity, we have found very little, if any, danger in the above procedure.

In 1924 Vaughan and Brams (5) reported 29 cases of perforated ulcers in which 25 (86.2 per cent) showed free air. Just recently Vaughan and Singer have reported 72 cases, of which number 82.6 per cent showed free air. Not all of the cases with perforated ulcer were examined by this method—of the 72 cases, only 23 (31.5 per cent) were radiated. This is to be borne in mind, since the 72 cases were seen in 1928. The 1929 results are somewhat different: of the 72 cases seen in 1928, all proven cases, we had 31 deaths, or 42.5 per cent. During 1929 we have encouraged this method of examination to the attending staff, so that, of the 35 cases so far studied, there was air in 10 (43.5 per cent). Of the 35 cases studied, 23 (65.7 per cent) received X-ray examination, which is nearly twice as many as in the previous year. This accounts for the smaller percentage of cases that showed air. There were 11 deaths (31.4 per cent) in the 35 cases.

The two previous reports on these cases showed a high percentage with free air. This year's report is much lower, due to two reasons: (1) More cases were subjected to X-ray examination; (2) The clinicians were able to recognize more cases of ruptured ulcers, using the history and physical findings. In other words, fewer were sent to the operating room with the diagnosis of ruptured appendix and empyema of the gall bladder.

It does appear from this report that the examination is certainly justified, in spite of the fact that the percentage of positive cases is much lower than previously reported. The findings are so positive when seen that proper steps for treatment—not an exploratory laparotomy—can be instituted immediately. It certainly is more efficient to make as nearly accurate a diagnosis as possible, especially where competition is keen and where considerable teaching is carried on. The history and physical findings are not always as accurate as they might be, so that any other aid we may offer should be received with favor. Geier (1) states from his observation of one case that air should be present in all cases of ruptured peptic ulcers. We feel that a study of 108 cases in the last two years adds something of value as far as results of this method of examination are concerned.

We do not offer this method as a substitute for the history and physical findings, but merely as an aid to diagnosis. With the high percentage previously reported, it was a habit with the interns to send patients to the X-ray department without taking a good history, in the hope that air would be found and they would have less to do. Some of the patients are so sick that a satisfactory history—enough to base a diagnosis of peptic ulcer upon—is very difficult to obtain.

I have previously stated that a few of these cases can be treated by medical management: this statement is broad and not agreed to by many clinicians. It takes keen judgment to say whether or not the patient should be operated upon. Complications do take place and it is difficult to say whether the ulcer is closed or whether the exudate will absorb. Some of our patients, treated by medical management, returned for treatment of subphrenic abscess, because their

cases had not been studied sufficiently in the beginning.

The length of time the air remains in the peritoneal cavity is not definite. In one case we observed it for fifteen days and in another for eleven days. These two cases were treated by medical management and no complications have occurred during the last three months.

CONCLUSIONS

1. Of the patients of whom X-ray examination was made, 43.5 per cent showed free air in contrast to 86 per cent reported before.

2. This method is merely an aid to diagnosis and not a substitute for history and physical findings.

3. The time consumed in the examination is so short that there is very little danger to the patient.

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RESULTS OF TREATMENTS OF FIBROID UTERI WITH ROENTGEN RAY: A SERIES OF 50 CASES[1]

By E. C. FRANING, M.D., GALESBURG, ILL.

IN the treatment of any disease it is the duty of the physician to help Nature, in as simple and effective a way as possible, to control the cause and heal the defect caused by it.

In choosing a method of treating the fibroid uterus there are many things to be considered: the weightiest one is the condition of the patient's health following any procedure. This should be in the broadest sense possible, including the mental and physical shock from the method used and the effect on her whole economic life.

From a biological standpoint it is impossible to settle definitely the question as to whether X-ray or surgery should be the method used, because it has not yet been determined what immediate or ultimate effect X-ray has on the cells of the body—that is, on the cells immediately in the field of the X-ray and on the distant organs, on the ovum and the offspring and their offspring.

There is one class among the cases of fibroid uterus or menorrhagia in which the method of treatment is very definitely determined—a woman who may possibly bear a child later should not be given a therapeutic dose of X-ray. In the light of our present knowledge of the effect of the X-ray on the cells, women with fibroids, to whom it is possible to preserve the maternal function by surgery, are distinctly surgical cases. These are the women who are in the child-bearing period of life and have a limited number of fibroids that can be excised without removing the uterus or both tubes or ovaries.

A second class of cases includes those that are distinctly cystic; these are without argument surgical. A third class of cases of pelvic tumors numbers those that are distinctly inflammatory; these are also surgical, as there is very little evidence that the X-ray has a beneficial effect in these cases and some evidence that it is harmful.

A class of cases of pelvic tumor which is open to considerable argument is the class in which a complete diagnosis cannot be made. The case may be a cyst or it may be an old inflammatory mass or a combination of two or more. After all the methods of diagnosis have been exhausted and it is still doubtful, it should be considered surgical and turned over to that department. There is, finally, a class of cases in which the fibroid or myoma is so large that a long time would be required to accomplish its regression, or in which the newgrowth, while not so large yet gives rise to many painful symptoms and to invalidism: a case in this class would be relieved by radiation only after a comparatively long period, and should be considered surgical.

This still leaves a class of pelvic tumor—distinctly fibroid or myoma—of the size and position to be amenable to radiation treatment. Such a tumor should be treated by radiation therapy, because (1) there is no death rate from the X-ray; (2) radiation in therapeutic doses sterilizes and produces the menopause in a patient but does not desex her; (3) it avoids the nervous shock and leaves the patient in a much more natural state of mind; (4) radiation is simple, easier on the patient physically, mentally, and financially, and does not confine her to bed and cause a great amount of disturbance in the household.

The death rate from hysterectomy for fibroids and myomata is still so high that, if for no other reason, these cases which are

[1]Read before the Radiological Society of North America at the Fourteenth Annual Meeting, at Chicago, Dec. 3–7, 1928.

uncomplicated should be radiation cases. A death rate of from 2 to 10 per cent should have great weight in determining the method to be used. There is no doubt but that the idea of hysterectomy at any age has a profound influence on the mental condition of the patient, as it usually means desex to her, and in many instances, of course, a disturbance in her married life. Radiation therapy does not disturb the mental or physical state of the patient, thereby avoiding the operative shock which invalidizes all patients for a few months, many for years, and some for life. It is a great relief to patients on whom a diagnosis of fibroid tumor has been made, to be told that they can be cured by radiation and that all they have to do is to lie down on a table and have the ray applied for from half an hour to an hour and they may go home and resume their accustomed routine.

In the series of 50 cases reported, the X-ray was used for radiation; the technic was controlled by Dessauer's charts and a standardized tube. In the first 25 cases a heavy dose, or an "erythema dose," was given over the tumor: in the last 25, half an "erythema dose" was given, 180 K.V. being used in all cases.

Mortality.—There were no deaths.

Morbidity.—In the first 25 cases, when a large dose was given and the patient had had no preparation, 75 per cent of them had nausea and vomiting for a day or two. Anorexia was a common and rather annoying symptom for a few days or a week but always cleared up.

A patient, 35 years of age, came with an enlargement of the abdomen, a condition which she had noticed over a period of six years. She had had an Albee operation for Pott's disease, complicated with pulmonary tuberculosis, ten years previously. Upon examination we found a fibroid tumor the size of an eight months' pregnancy. In view of the history and the patient's poor condition, surgery was out of the question. We gave her an "erythema dose" at tumor depth. She was nauseated and vomited for several days, and ten days after treatment developed a temperature ranging from about 101 in the morning to 103 in the afternoon. This continued for six weeks. The Widal test was negative. Blood count: reds, 3,000,000; whites on several counts from 10,000 to 12,000, with about 40 per cent small mononuclears and leukocytes. She was completely negative on all examinations as to any localized or general infection. Her temperature dropped by lysis and she made an uneventful recovery. When she was given her treatment she weighed only 90 pounds; in eighteen months she weighed 180 pounds, and the tumor had completely disappeared.

Among the last 25 cases, which were given the 50 per cent "erythema dose" and only light or soft diet for the two or three preceding meals, and orange juice or light liquids after treatment, only 10 per cent had nausea or vomiting.

Menorrhagia.—Excessive or prolonged menstrual flow was present in 75 per cent of the cases. Of this group of patients who had the "erythema dose," 30 per cent menstruated only once after treatment, 25 per cent menstruated twice, and 15 per cent menstruated three times; 30 per cent did not menstruate after radiation.

Of the 25 cases given the "half erythema dose," 30 per cent menstruated only once, 25 per cent menstruated only twice, 30 per cent menstruated three times, and 15 per cent failed to menstruate after treatment. In no case did the treatment fail to stop the menses. In three of the last 25, the menses or menorrhagia returned. These were given a second "half erythema dose" which completely stopped the condition.

Effect on tumors.—In the first 25 cases the tumors began to shrink noticeably in about four months from the time of the treatment, and the symptoms in the majority of cases began to improve. At the end of

a year the symptoms had disappeared and in most cases the tumor was decidedly smaller.

Menopause.—The menopause in the series of 50 cases treated was not different nor the symptoms more severe than the natural menopause of fifty consecutive, apparently normal women.

Sex life.—The sex life of the 50 cases treated by radiation was not different from the sex life of a series of fifty consecutive cases who had gone through the menopause normally. The patients were left with all their sex organs intact, a fact which has an immense psychical effect as well as constituting a great relief from worry. This point alone should have great weight in favor of radiation.

CASE REPORTS AND NEW DEVICES

EFFICIENCY ENGINEERING IN THE DARK ROOM

A MECHANICAL CONVEYOR AND AUTOMATIC TIMER FOR THE WASH TANK, WITH REMOVAL OF THE WASHING AND DRYING OPERATIONS TO THE DAYLIGHT

By W. EDWARD CHAMBERLAIN, M.D., Professor of Medicine (Radiology), Stanford University Medical School, SAN FRANCISCO

From the Department of Radiology, Stanford University Hospital

Most of the problems connected with roentgen diagnosis are of such a nature as to require individual solutions. If we are to get the most out of every examination, no two cases can be handled exactly alike. Individual treatment of every case results in more intelligent search, and overstandardization is to be avoided.

But there is one element in the chain of procedures between the radiographic room and the final interpretation of the films which will bear standardization, and even "efficiency engineering."

Fixed time development, in calibrated developer, at a fixed and appropriate temperature, produces results, especially in a large, busy hospital department, which are so far superior to the erratic performances with variable factors, that more than passing comment on this subject is superfluous.

The "dark room" here described has been in service for two years, and has justified our fondest expectations. In our former dark room, which was of the conventional

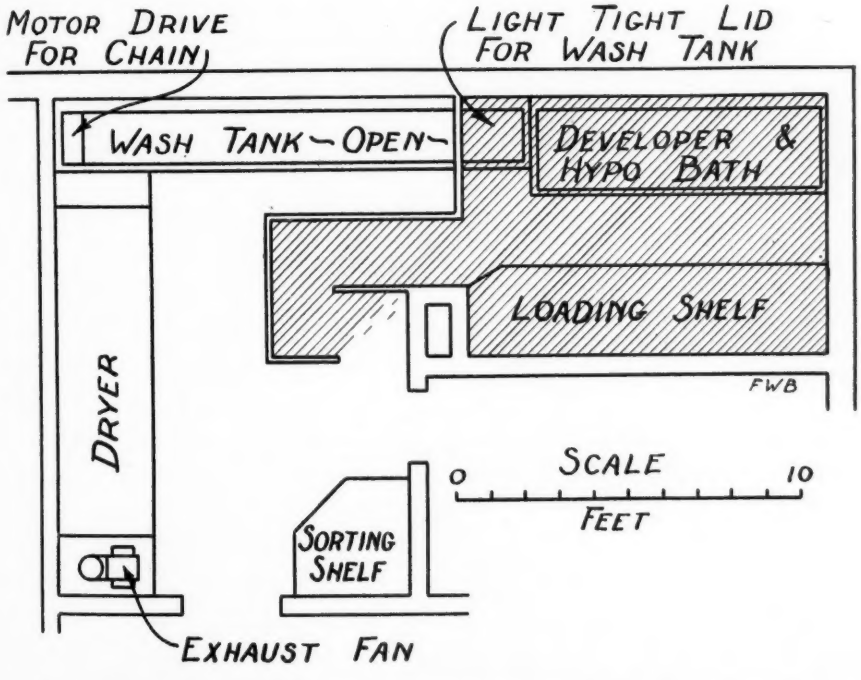

Fig. 1. Floor plan of the dark room (for developing and fixing) and of the "light room" (for washing and drying). One end of the wash tank protrudes through the wall into the dark room, where it adjoins the hypo tanks.

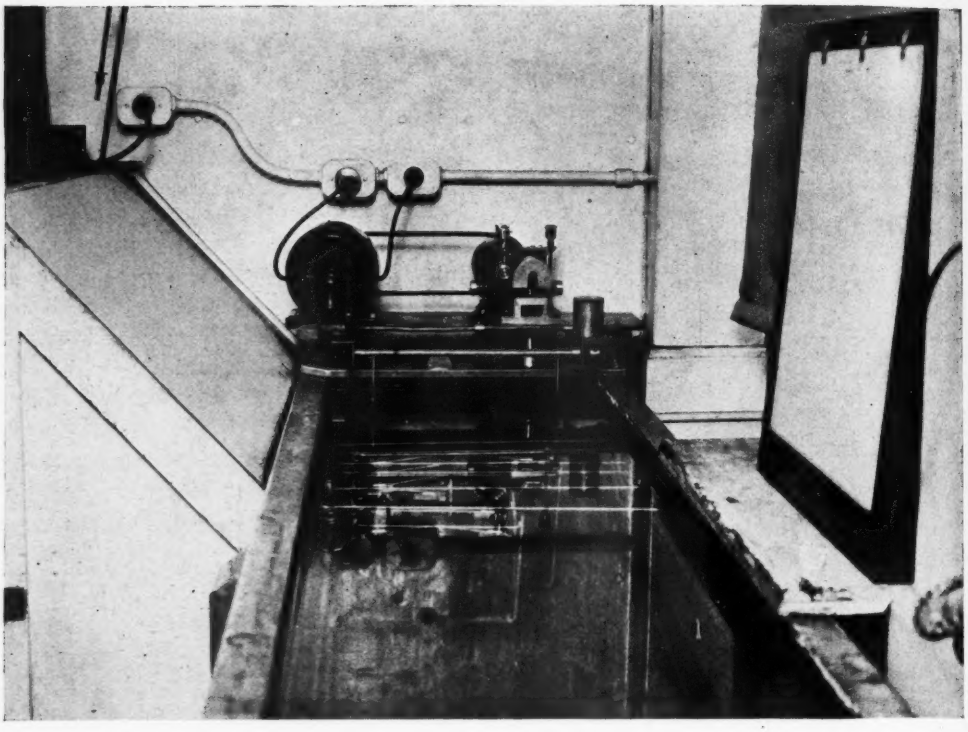

Fig. 2. Photograph of the motor drive which moves the films toward the drier at the rate of four and a half inches per minute. Note the trigger which shuts off the power and pilot lights when the film hanger reaches the end of the tank.

type, and of a size quite up to the average in large, busy departments, we had an excellent drier, but films were delayed in the wash tank (the washing operation being frequently prolonged when the technician did not know which of the films had had sufficient time), the congestion backed up into the hypo bath, and even farther, at times, onto the loading shelf. The average time from radiographic room to viewing room was four hours. With our present arrangement it is one and a half hours. And formerly the films were in the dark room during the entire four-hour period, whereas with the present system the films stay in the dark room for only from twenty to twenty-five minutes.

One of the chief causes of delay in the old days was the shutting-down of the dark room routine while lights were turned on, to find and examine an unfinished film. It is hardly necessary to point out that removal of washing and drying operations from the dark room, and shortening the time between radiographic room and viewing room to one and a half hours, have reduced dark room intrusions to an absolute minimum.

In the design of this installation, attention was paid to

TEMPERATURE REGULATION

A twenty-gallon developer tank, of enameled steel, is immersed in a 65° F. water

bath, with a large clear-vision dial thermometer on the wall over the tank, with supplies of hot, cold, and ice water for convenient regulation.

correct exposures to a standard density from day to day and even from year to year.

But the unique feature of the installation lies in the

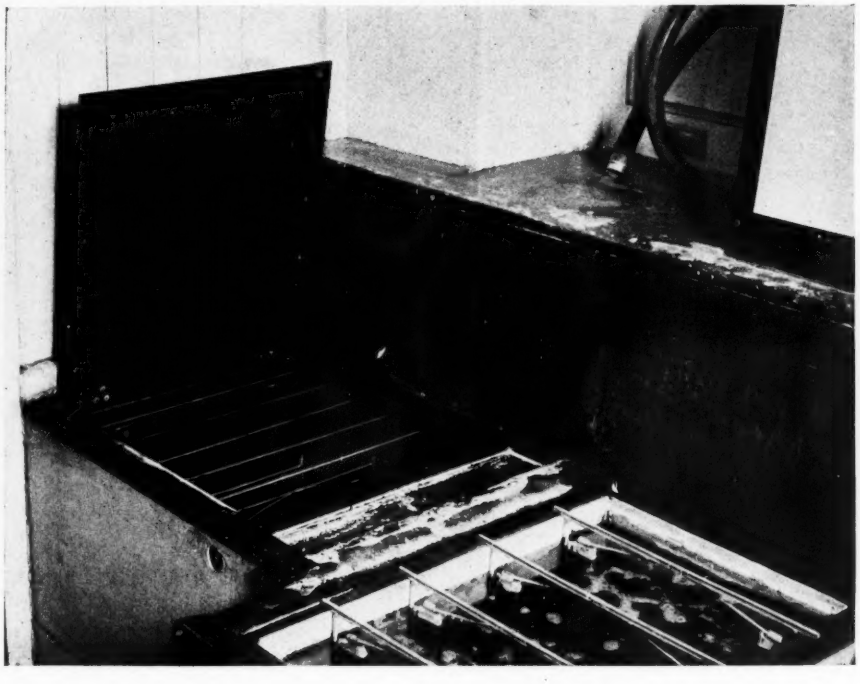

Fig. 3. Photograph of the dark room end of the wash tank, with the light-proof bakelite lid raised, in readiness for transfer of films from the hypo into the wash tank.

VENTILATION

In addition to an open light-proof entrance maze, there are light-proof open air vents.

DAILY CALIBRATION OF DEVELOPER

Films which have been exposed under a thin copper "step ladder," to exactly 0.33 r-units of 200 K.V., copper-filtered X-ray, from a specially calibrated machine, are developed, and then compared with a standard. Changes in developer strength, thus discovered, are compensated for by changing the time factor. This insures development of

MECHANICAL CONVEYOR AND WASH TANK

The wash tank is thirteen feet long, and lies in the "light room," with drier and sorting shelf, except for a two-foot projection through the south wall of the "dark room" (Fig. 1). The dark room wall is built snugly around the wash tank, and when the bakelite lid (Fig. 3) is closed down, daylight is completely excluded.

On each side of the wash tank, a special monel metal endless chain[1] runs on a shelf, between a motor-driven sprocket (at the

[1]Manufactured to order by the Boston Gear Works, Quincy, Mass.

drier end of the tank) and an idler sprocket (at the end toward the hypo tanks). The return chain travels below the shelf, behind a smooth monel metal guard plate, being thus prevented from catching on the moving film frames. Idler sprockets at suitable intervals prevent this long return chain from sagging excessively (see Fig. 4).

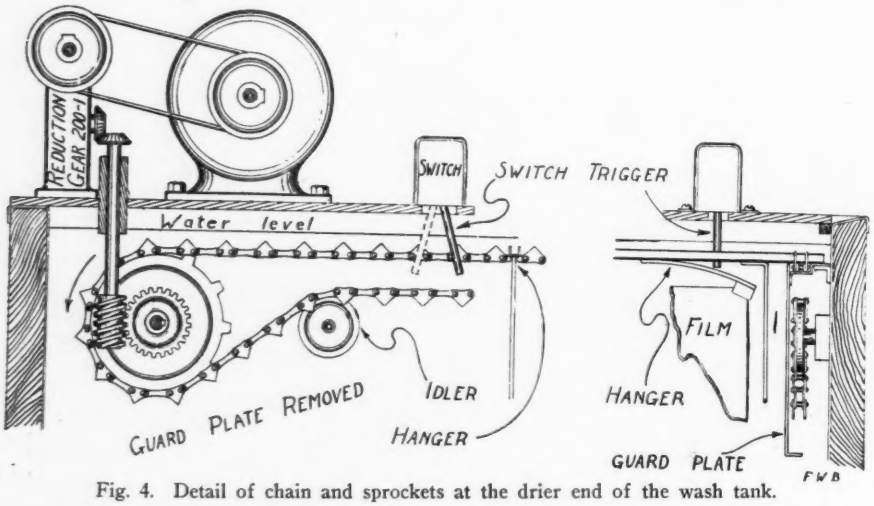

Fig. 4. Detail of chain and sprockets at the drier end of the wash tank.

The drive is from a small, quiet motor (1,800 R.P.M.) belted to a very high-ratio reduction gear, designed so that the chain moves four and a half inches per minute. The gears and bearings run in oil except those in the last couple, which are below the water level. The use of lignum vitæ in the bearings and gear, with a brass worm, has successfully solved the problems of wear and lubrication at this point. After two years in daily use, the conveyor shows no signs of excessive wear or decay, but we are having a second chain manufactured, and will soon remove the original chain for inspection and possible replacement of parts.

When the films have been in the wash water twenty minutes, they reach an indicator mark and may be removed to the adjacent drier. If the technician is busy or neglects her opportunity, an additional ten minutes brings the first film frame to the trigger (Fig. 2), and the motor is stopped. Simultaneously with the stopping of the conveyor, pilot lights at the chief clerk's desk and in the dark room are extinguished, and the technician must remove the fully washed films from the tank before she can return the trigger to the running position, lighting the pilot signals and starting the motor.

The drier is efficient and convenient, and more than thirty minutes is never required for the largest films. Steam heat and a three horsepower blower (connected as an exhaust fan) are the essential elements in this unit.

Mr. A. B. Saunders, chief engineer, and Mr. George Hayes, mechanic, are responsible for the construction of the tank system, conveyor, and drier.

ATTACHMENT FOR SWEET EYE LOCALIZER

By HAROLD G. F. EDWARDS, M.D.,
SHREVEPORT, LA.

A great many roentgenologists who are called upon to make only an occasional localization of foreign body in the eye or orbit are using the original Sweet localizer, be-

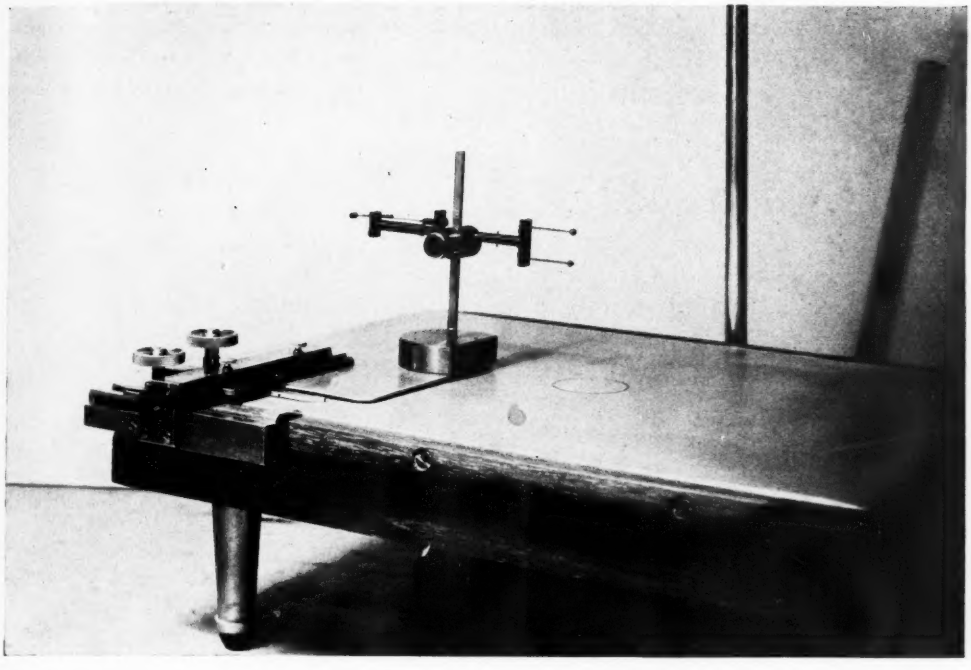

Fig. 1. A simple addition to the original Sweet localizer, consisting of side rails and a Spencer mechanical stage to which is attached a small plate upon which the localizer is permanently fixed. With this arrangement, lateral and forward movements of the localizer are accurately and easily made, and, when once aligned, there is no fear of its moving about.

cause of the cost of the improved model Sweet localizer.

Anyone who has worked with the original model has certainly been confronted with the annoyance of having the localizer shift out of place after the proper alignment has been accomplished, because the small base allows very easy movement in any direction.

The exact interpretation of the results obtained in localization is made on the relative positions of the shadows of the foreign body and of the cone and ball, and it is, therefore, essential that, once the correct alignment has been obtained, the localizer shall remain in the correct position.

The writer submits herewith a simple addition to the original Sweet model, consisting of side rails and a Spencer mechanical stage to which is attached a small plate upon which the localizer is permanently fixed. With this arrangement, lateral and forward movements of the localizer are accurately and easily made, and, when once aligned, there is no fear of its moving about. The mechanical stage can be moved along the side rail so as to compensate for the short forward travel; it can also be used on either side, for right or left eye localization. The cost is small, while the time saved and the assurance that the localizer will stay "put," are well worth it.

HERNIA THROUGH THE ESOPHAGEAL OPENING OF THE DIAPHRAGM

By C. C. ANDERSON, M.B., Ch.B., D.M.R.E.,
Lecturer in Radiology, University of Otago,
New Zealand

Probably all diaphragmatic hernias are more or less congenital in origin; even post-operative cases, as Åkerlund (1) points out, probably develop as a result of a congenital weakness of the diaphragm, otherwise we should see this condition in nearly every individual whose diaphragm is submitted to surgical intervention. In the same article Åkerlund traverses the theories as to the causation and development of diaphragmatic hernias, with special reference to those occurring through the esophageal opening. These he divides into three main classes, with intermediate varieties:

Fig. 1-*A*. Prone position showing straight and shortened esophagus, with upper portion of stomach herniated through the esophageal opening of the diaphragm.

1. Hernias with a congenitally shortened esophagus, which makes replacement of the affected viscera impossible.

2. Para-esophageal hernias which occur in the presence of a normal non-herniated esophagus.

3. The remaining cases of hernia in which the esophagus, although not shortened, itself forms part of the contents of the hernial sac.

Class 1, according to his survey of the literature, occurs very infrequently, which lends greater interest to the case to be reported. According to Tonndorf (4), the ultimate cause of the formation of the hernia is an arrest of growth of the esophagus. Åkerlund feels that there is much to be said for Bund's (2) theory that herniation of this type is due to persistence of the right pneumato-enteric recess; but he goes even

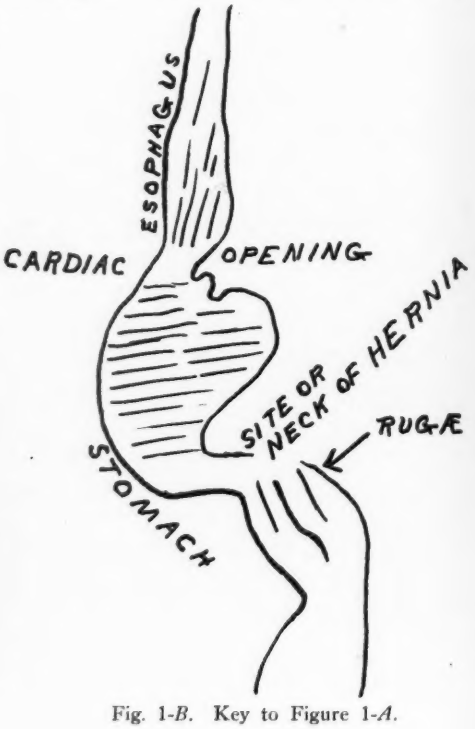

Fig. 1-*B*. Key to Figure 1-*A*.

further and considers that persistence not only of the right but also of the left pneumato-enteric recess goes a long way towards explaining not only this type but also other types. Perhaps one might even put it another way and say that, in view of the migration that the diaphragm and the stomach undergo, the wonder is that malformations and malpositions occur so infrequently.

In a paper on the clinical aspect of herniation through the esophageal orifice of the diaphragm, Öhnell (3), basing his opinion upon a consideration of 24 cases, gives the following as the main symptoms: Pain of an epigastric type, generally noted immediately after deglutition, vomiting or waterbrash, constipation, and a definite periodicity. Dysphagia was noted in a small number of cases, while cardiac and pulmonary symptoms were also present in a similar number of cases, namely, four. For the most part, other published cases appear to exhibit similar symptoms.

Fig. 2-*A*. Upright position showing narrowing of the stomach, with rugæ outlined, just where it passes through the diaphragm.

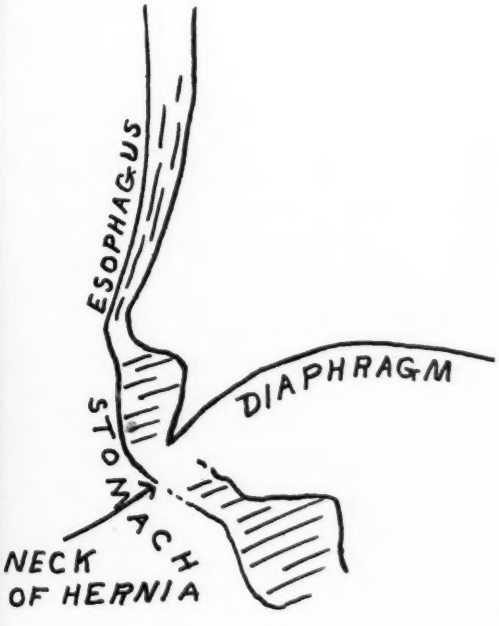

Fig. 2-*B*. Key to Figure 2-*A*.

Åkerlund's theory is that, should these two recesses not only persist but enlarge and unite, there would be a projection of the embryonic peritoneal cavity up and around the lower end of the esophagus, which is thus freed from the diaphragm and fails, as a consequence, to grow down with it. This appears to be a very reasonable theory and one which covers the whole ground.

The case to be reported, a female, aged 57 years, was referred to the X-ray Department of the Dunedin Hospital on April 19, 1928. She was an obese, middle-aged woman, who appeared to suffer no discomfort

as a result of her affliction. She gave a history covering the past three weeks that food "seemed to stick low down in the gullet." There was more difficulty in swallowing meat, particularly mutton. Ten days previously the trouble had been very bad, but latterly she had improved though her condition varied. She was putting on weight in spite of dieting, though recently she had succeeded in reducing by three pounds.

Screen examination proved difficult on account of the extreme girth of the patient, but it was determined that there was slight delay about the diaphragm and that the esophagus was definitely dilated.

The radiographs (Figs. 1 and 2), taken both in the upright and the recumbent position, in the oblique and the ventral plane, showed a narrowing of what was apparently the esophagus some two or three inches above the diaphragm. Immediately below this the shadow widened considerably, becoming continuous below the diaphragm with the shadow of a stomach much reduced in size. The communicating portion was broad and showed the outline of the rugæ of the gastric mucous membrane. The shadow of the esophagus itself was slightly broadened, but showed no evidence of tortuosity.

The decreased size of the gastric shadow, the supradiaphragmatic bulging of the intrathoracic portion of the shadow of the opaque meal, the broad communication showing the rugæ, and the straight esophagus were all held to be points in favor of a hernia through the esophageal opening of the diaphragm (Åkerlund Type 1), in spite of the fact that Åkerlund in his own series had no case that he could establish as belonging definitely to this group.

In view of the X-ray findings, operation was considered to be contra-indicated and the patient was advised to continue with a diet which did not cause her any dysphagia or distress and to keep her bowels regulated. In this way it was hoped that she would be reasonably comfortable and that her condition would not be aggravated.

It is interesting to note in this case the comparatively late onset of symptoms, and that the patient was extremely well nourished, facts which may be taken as showing that this condition does not invariably incommode gravely those suffering from it.

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EDITORIAL

M. J. Hubeny, M.D. . . . . *Editor*
Benjamin H. Orndoff, M.D.
John D. Camp, M.D. } *Associate Editors*

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THE PROBLEM OF ENLARGED THYMUS

The widespread diversity of opinion in regard to enlarged thymus and its treatment has reached serious proportions. A considerable amount of acrimonious literature has accumulated which has tended to becloud the real issue.

It is apparent that there are two distinct schools of thought in regard to this condition. One group believes that enlargement of the thymus gland can and does cause the symptoms associated with the so-called thymic syndrome. The other school denies that the thymus gland plays any part in producing symptoms in children and ascribes the symptoms to other conditions.

The function of the thymus is not definitely known, but it would appear to be inter-related in some manner with the sex glands, the thyroid, and the suprarenals. It is, however, not essential to life or health. Pathologically no clear line can be drawn between thymic hyperplasia and status thymico-lymphaticus as separate conditions. Very few necropsy cases of enlarged thymus have been reported in the literature in which there was not also an associated status lymphaticus condition. Status lymphaticus is characterized anatomically by delayed involution or hyperplasia of the thymus, hypertrophy and hyperplasia of the lymph glands and lymphoid tissue of the various organs, under-development of the chromaffin, gonadal, and cardiovascular system, and certain peculiarities of external configuration.

The mechanism of the production of symptoms from a thymic point of view has never been satisfactorily proven, but there are some facts pointing toward the mechanical theory. The thymus is confined in a very small space and theoretically could cause compression of the trachea rather easily. Compression of the trachea has been reported from bronchoscopic examination, from lateral roentgenograms of the chest, and at the necropsy table. This theory is also supported by the prompt relief of symptoms in certain cases following radiation therapy.

If, however, one assumes that the thymic enlargement is a part of the general status lymphaticus, a number of other possibilities for causation of so-called thymic death are open for consideration. First, it may be a result of the constitutional defect shown by increased vagus tone, deficiency of the chromaffin system, and weakness of the sympathetic system. Second, it may be a result of hypersusceptibility to physical and chemical agents. Third, it may be a result of anaphylaxis. Fourth, it may be due to an abnormal thymic secretion of lymphotoxemia. Recently series of cases have been reported by Symmers, Zeek, and Anderson and Cameron in which death was caused by rupture of hypoplastic cerebral vessels, with resultant hemorrhage. This may suggest a fifth postulate. According to Symmers, "The cerebral vessels, particularly the arteries of the circle of Willis and its branches,

are often small in caliber and extremely thin and delicate. In the gross they are collapsed and translucent. Microscopically they are apparently deficient in the muscular coat, which is definitely less developed than usual." In another reported case some of the arteries involved in this process supplied the nodes and muscles of the His bundle system in the heart, and there were hemorrhages in the myocardium. Thus it is seen that here is a theory presenting a concrete cause for production of the sudden so-called thymic death.

It is probable that only certain cases are due to this cardiovascular defect, as in the several series reported only a few cases out of each group showed this defect. How many cases are due to the causes enumerated above is a controversial question. Many deaths can be shown to have followed the application of physical and chemical agents, and many suggested anaphylactic shock, but positive proof of the mechanism of death in these cases is a difficult matter.

Radiation therapy has been attacked on the ground that there was grave danger of causing damage to the thyroid, myocardium, and other surrounding structures. In certain cases this has been found to be true, but this should be a criticism of the operator and not of the treatment, as every competent radiation therapist realizes that the thymic tissue is among the most radiosensitive of all bodily tissues. A very small dose of moderate voltage is required, and if no clinical result is obtained after several treatments, the attempt should be abandoned because of probable incorrect diagnosis.

From an impartial study of the literature on this subject, it is evident that the two points of view are so divergent that no opinion can be reached from the clinical reports. The solution of this problem will be brought very much closer if we can demonstrate the mechanism of the production of thymic death. It is incumbent on all radiologists to help in this solution by reporting every thymic case which has come to necropsy and especially the cases which have had radiation therapy.

HOWARD P. DOUB, M.D.

MINNESOTA RADIOLOGICAL SOCIETY

An organization of radiologists, to be known as the Minnesota Radiological Society, was recently formed. The first formal meeting was held at Rochester, Minnesota, on March 1, 1930. The following program, arranged by Dr. B. R. Kirklin, was presented:

1. "Roentgenologic Manifestations of Malignant Disease in the Colon," by Dr. H. M. Weber.
2. "Gastro-jejunal Ulcer," by Dr. J. D. Camp.
3. "X-ray Studies on Tuberculous Spine in Children," by Dr. R. K. Ghormley.
4. "Mediastinal Empyema," by Dr. Jacob Sagel.
5. "Roentgen Diagnosis of Small Pleural Effusions," by Dr. L. G. Rigler.
6. "Specific Radiosensitiveness of Cells and its Significance to Radiotherapy," by Dr. A. U. Desjardins.
7. "A Radium Technic in the Treatment of Carcinoma of the Cervix Uteri," by Dr. R. E. Fricke.
8. "Results Obtained from Irradiation Therapy in Cases of Carcinoma of the Cervix Uteri," by Dr. H. H. Bowing.
9. "Use of Iodized Oil in Gynecological Diagnosis," by Dr. L. M. Randall.
10. "Preliminary Report of Intravenous Urography by Means of Uroselektan," by Dr. C. G. Sutherland and Dr. W. F. Braasch.

The next meeting will be held at Duluth, Minnesota, July 14, 1930.

THE COFFEY-HUMBER CANCER TREATMENT

The American Association for Cancer Research, meeting in New York City, was addressed by Burton T. Simpson, M.D., Director of the New York State Institute for the Study of Malignant Disease, on the subject of cancer therapy, with specific remarks concerning his visit to Dr. Walter B. Coffey, of San Francisco, and his observation of the treatment which has attracted such wide public notice.

Of the latter Dr. Simpson said, in part: "In justice to Dr. Coffey, I believe he was quite honest in his report to the medical profession. He does not himself claim a cure nor does he accept pay for the treatment. The injection of extract of the cortex of the adrenal gland under the skin of the patient's arm has been used in other researches into cancer cures, and has not satisfied the medical profession. Under certain conditions the cancerous growth might appear to be healed, but, at best, it could not be pronounced cured until at least five years had elapsed. Dr. Coffey has treated only persons with malignant lesions elsewhere declared to be incurable. No treatment can fairly be judged by its application to patients in the final stages of the disease. The important thing now is to warn the public not to rush to San Francisco with false hopes of a cure."

Dr. Simpson continued: "The situation in regard to cancer cures remains just where it was. There are several reliable treatments for cancer in its early stages—surgery, radium, X-ray, diathermy, and cautery."

Radium to the amount of six grams, for the sum of $300,000, is being acquired by the Buffalo institution of which Dr. Simpson is Director.

The meeting was attended by prominent laboratory investigators, who agreed with the speaker that no cure for cancer in its later stages has yet been found, though year by year more is gradually being learned, the advance being in the direction of highly technical discoveries which have not yet any practical application.

The meeting was devoted largely to reports of laboratory investigations of cancer, as distinguished from clinical investigation. Among those reading papers were William Carpenter MacCarty, M.D., of the Mayo Clinic; A. S. Warthin, M. D., of the University of Michigan; E. C. MacDowell, M.D., of Cold Spring Harbor, Long Island, and Maurice N. Richter, M.D., of New York City.

The presiding officer was F. B. Mallory, M.D., Professor of Pathology at Harvard University, who is retiring from the office of President of the Association. He is being succeeded by Dr. C. C. Little, former President of the University of Michigan and now of New York City. Francis Carter Wood, M.D., Director of the Institute for Cancer Research of Columbia University, founded by George Crocker, was chosen Vice-president, and William H. Woglom, M.D., Associate Professor of Cancer Research at Columbia University, was re-elected to the joint office of Secretary-treasurer.

LEGAL MEDICINE

In a recent decision rendered by the Iowa Supreme Court, a judgment against the defendant in a damage suit was confirmed mainly on account of—and because of—a ridiculously assumed medical conclusion.

An employee of a large and prominent manufacturer of X-ray apparatus was installing X-ray equipment in a physician's office, and a woman assistant of the physician was asked (and consented) to submit to a trial exposure. Later, she claimed to have sustained injury as the result of the exposure, and subsequently sued the company that had installed the apparatus, securing a judgment in the trial court for $4,000. Ap-

peal to the Supreme Court resulted in a confirmation, as above stated.

Apparently, the decision hinged largely upon the testimony given by a physician brought in from a neighboring state, to the effect that in the making of the roentgenograms of the head, *sufficient X-rays reached the pelvis of the patient to cause the production of a premature menopause, at the age of 36 years, as well as to affect the third cranial nerve and cause an ophthalmoplegic migraine.*

The testimony of this witness is of such a fanciful nature that one cannot help wondering where he secured his information, and, if not fraught with such serious import, it would be excruciatingly funny.

I. S. TROSTLER, M.D.

CORRECTION

In the review appearing on page 424 of the April issue of RADIOLOGY, the name of the chart should have been given as the Bachem-Kobak Chart, the joint authors being Albert Bachem, Ph.D., and D. Kobak, M.D. The particular chart on which comment is made is No. 3 of six Physical Therapy charts, the subject covered by this one being the roentgen ray. Published by E. Bachem, 1337 Winona St., Chicago.

BOOK REVIEWS

STANDARDS YEARBOOK, 1930. Compiled by the National Bureau of Standards, George K. Burgess, Director. Bureau of Standards Miscellaneous Publication No. 106. For sale by the Superintendent of Documents, Washington, D. C. Price 75 cents.

A perusal of the Contents of the yearly report of the Bureau of Standards reveals the not inconsiderable number of professions and industries which benefit from the researches of this Governmental Department. The Bureau has co-operated with the country's radiologists in their endeavors (1) to develop means by which the dosage of X-rays can be accurately measured and specified, (2) to secure improved protective materials and devices, and (3) to minimize hazards of all kinds.

Mr. Lauriston S. Taylor, Physicist of the Bureau, has lent the weight of his influence to the development of dosage measurement in the United States.

X-RAY TECHNOLOGY: THE PRODUCTION, MEASUREMENT, AND APPLICATIONS OF X-RAYS. By H. M. TERRILL, PH.D., Associate in Physics, Institute of Cancer Research, and C. T. ULREY, PH.D., Research Physicist, Westinghouse Lamp Company. Published by D. Van Nostrand Co., Inc., 250 Fourth Ave., New York, 1930. Pp. 256. Price $4.50.

This book, although written primarily for physicists, laboratory workers, and engineers interested in the technical uses of X-rays, will be of great value to the radiologist interested in research or dosimetry. The omission of descriptions of the archaic gas tube, coil, interrupters, measuring devices of merely historical importance, and abstruse mathematical "shorthand" is novel in a text of this kind. Practicability is emphasized throughout the whole book, valuable suggestions are freely made, and controversial and purely theoretical questions are largely avoided. This text deserves a prominent place in the library of every one who is interested in the practical medical, industrial, or research applications of X-rays.

ABSTRACTS OF CURRENT LITERATURE

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CANCER (DIAGNOSIS)

Primary Carcinoma of the Lungs and Bronchi. George Hodge. Can. Med. Assn. Jour., January, 1930, XXII, 60.

Primary carcinoma of the lung is not so rare a disease as it was formerly thought to be. In its diagnosis bronchoscopy is the most important aid we have. Most of the malignant tumors of the lung have their beginning in a bronchus, and are within easy reach of the endoscopist's forceps, so that a snipping for microscopic examination may be made. We are apt to depend too much on the X-ray in the diagnosis of thoracic lesions. Carcinoma in a bronchus near the lumen will not at first be found by the X-ray unless it causes stenosis. An intra-bronchial tumor may cause considerable dyspnea, without any infiltration or lung shadow being seen.

L. J. CARTER, M.D.

A Contribution to the Knowledge of Roentgen Carcinoma Due to Exposure. Paul Krause. Strahlentherapie, 1930, XXXV, 210.

The author relates, in detail, the history of an X-ray technician, 50 years of age, who had been working with X-rays for 25 years. In 1904, he noticed on the extensor side of the right hand, small warts, which gradually increased in size. In 1922, a lesion formed in one of the larger warts, which showed no tendency towards healing. The hand swelled on the flexor side and there was considerable pain. In August, 1923, the right index finger and half of the metacarpal bone were amputated. The anatomical diagnosis was inflammatory changes of unknown origin; no tuberculosis. Later on, an ulcer developed in the scar and the author, who saw the case in March, 1924, diagnosed a roentgen carcinoma. A re-examination of the amputated finger verified the clinical diagnosis. The author strongly recommended amputation of the arm. However, in April, 1924, only the right lower arm, in the lower third, was removed. A prosthesis was made and used by the patient until the Fall of 1925. In October of that year, a recurrence developed in the glands of the right axillary region, which were removed. The microscopic examination showed an atypical carcinoma. In March, 1926, another recurrence appeared in the same region, which was followed by exarticulation of the right upper arm. A piece of a suspicious rib was also resected. The patient felt better for a while but then lost appetite and weight, and died in November, 1928. The autopsy showed metastases of the carcinoma in the thoracic spine and also in the kidneys. The author emphasizes the importance of early radical therapy in cases of this type.

E. A. POHLE, M.D., PH.D.

Carcinoma of the Bronchus. H. E. Macdermot and George Hodge. Can. Med. Assn. Jour., January, 1930, XXII, 77.

This is a case report, showing the value of the bronchoscope in clearing up the diagnosis. X-ray examination showed the whole of the right lung to be obscured by a dense shadow, with displacement of the trachea, heart, and mediastinum to the right. Aspiration gave the impression of a thickened pleura, but no fluid was obtained. The bronchoscope showed fixation of the right lung, absence of the normal lengthening and shortening of the right bronchus on respiration, and a nodular growth in the lower part of the right bronchus. A snipping from this growth showed carcinoma of the bronchial type. Autopsy showed a large yellowish mass near the hilum of the lung, extending directly down the right bronchus from the bifurcation of the trachea. This mass had occluded the main bronchus and caused collapse of the lung, with subsequent necrosis.

L. J. CARTER, M.D.

CANCER (THERAPY)

Carcinoma of the Breast. Stuart W. Harrington. Journal-Lancet, Jan. 1, 1930, L, 1.

In a report of 1,859 cases of breast carcinoma, with operation, between 1910 and 1923, 34 per cent were without lymphatic involvement;

in this group 80 per cent were living after three years, 67 per cent after five years, and 53 per cent after ten years. In the 66 per cent in which metastases were present in the lymph nodes at the time of operation, 41.5 per cent were living after three years, 25.75 per cent after five years, and 12.23 per cent after ten years.

"A comparison was made of the results obtained when treatment by roentgen ray supplemented the radical surgical procedure with the results in those cases in which the roentgen ray was not used. The results were not improved in cases in which the roentgen ray was used as an auxiliary to surgical treatment. The practical significance of this comparison is that the surgical result depends on the thoroughness with which the operation is performed; the roentgen ray cannot be depended on to remove malignant tissue which has been left behind."

"I do not believe that a more radical operative procedure than the one now generally performed will improve these results materially."

W. W. Watkins, M.D.

Shall Cancer of the Uterus be Treated by Surgery or Radiation? George E. Pfahler. Penn. Med. Jour., February, 1930, XXXIII, 291.

The patient has the privilege of choosing between surgery and radiation only in the early stages, and the chance of recovery will depend on the skill of the operator and facilities available. A patient will have a better chance with a well equipped and capable surgeon, than with an unskillful or poorly equipped radiologist. The reverse is true, also. Surgery can be used in only three-tenths of the cases, and radiation or nothing must be used in the other seven-tenths. Surgical technic has been completely developed and available for twenty-five years; it has developed on the basis of the early cases, gradually undertaking the more advanced cases, until the limitations have been reached. Radiation began with the inoperable and far advanced cases and, having proved its worth in those, has gradually come to the treatment of the early cases. Radiotherapy is still developing and the more recent the statistics, the more favorable the results. In the operable cases, surgery and irradiation show nearly equal results. According to Lane-Claypon, of operable cases operated on, 34.1 per cent showed a five-year recovery, while of operable cases irradiated, 35.8 per cent showed a five-year recovery. Patients, therefore, have a perfect right to choose either method of treatment.

W. W. Watkins, M.D.

Carcinoma of the Cervix—Its Surgical Treatment. Hans von Geldern. Calif. and Western Med., January, 1930, XXXII, 32.

Regarding the selection of patients for surgery, most gynecologists now agree that the criteria for classifying cases as operable are normal mobility of the uterus, flexible and non-invaded fornices, lack of parametric infiltration, patency of the cervix, afebrility, and absence of pathogenic organisms in the cervical secretions. An increase in the number of surgical cures will depend on earlier diagnoses, all borderline cases being reserved for radium. Heyman's statistics, collected from twenty operative clinics, showed an average of 16.3 per cent for seventeen clinics using radiologic treatment. These figures can hardly be compared, as the radium statistics represent different material and more recent work. With radiologic therapy now a competitor of surgery, the percentage of relative cures has come to be a better index of the results of either type of therapy in similar cases. Some 3,659 extended operations, collected from the literature by Heyman, showed an average of 35.6 per cent recovery. No doubt a considerable proportion of these cases could not be considered operable in the sense in which we use the term to-day. Five-year end-results, collected from twelve radiologic clinics, showed an average of 34.9 per cent in operable and borderline cases. Wille, Weibel, Warnekros, Faure and Bonney, enthusiastic advocates of radical abdominal surgery, in their more recent reports show ultimate cures

in early cases ranging as high as 75 per cent, quite comparable to the results obtained in similar cases treated radiologically in the clinics of Heyman, Ward, Bailey and Healy, and Döderlein. It must be remembered, however, that these surgeons are unusually skillful and have developed technic over a period of years before attaining such results. A number of surgeons have obtained better results after using pre- or post-operative radiation in conjunction with their radical hysterectomies. Of 87 patients with carcinoma of the cervix treated in the Stanford Women's Clinic from 1912 to 1924, 26 were radically operated upon, and of these 38.5 per cent remained free of recurrence five or more years. The operative mortality was 11.5 per cent, with no operative deaths among 15 patients treated between 1918 and 1924. The absolute curability was 13.8 per cent. Most of the patients were treated with radium, pre-operatively, four to five weeks prior to operation, post-operative radiation being reserved for cases in which there was incomplete extirpation, or in which recurrences developed.

FRANCIS B. SHELDON, M.D.

Results of Roentgen Therapy in Carcinoma of the Breast. George E. Pfahler and Leo D. Parry. Jour. Am. Med. Assn., Jan. 11, 1930, XCIV, 101.

The authors review the results in their own series of private cases. They believe that patients should be referred for post-operative roentgen treatment as soon after the operation as is practical, certainly within four weeks. An unhealed wound is not a contra-indication to roentgen treatment. They have combined pre-operative with post-operative treatment since 1916.

It is generally recognized that irradiation is the best known method of treating recurrent carcinoma. The results to be expected from radiation therapy in inoperable carcinoma will vary with the stage of the disease, the extent of distribution, and the degree of malignancy. In cases in which the disease is operable from the standpoint of malignancy, but inoperable because of some other condition or absolute refusal on the part of the patient, a means of treatment is available in irradiation that should not be ignored.

C. G. SUTHERLAND, M.B. (Tor.)

Our Experience in Cancer Therapy with Colloidal Lead. Luigi Di Natale. Minerva Med., Dec. 22, 1929, IX, Pt. 2, p. 997.

The author has studied both experimentally and clinically three different preparations of colloidal lead. He has failed to observe any selective action upon cancerous cells or any dangerous toxic action by two of them, while, in the case of the third, "Collosol Plumbum," he deems the effects on tumor tissues to be negligible when compared to the alarming toxicity of the preparation.

L. MARINELLI.

The Treatment of Inoperable Carcinoma of the Rectum. George E. Binkley. Can. Med. Assn. Jour., January, 1930, XXII, 17.

The palliative treatment of inoperable carcinoma of the rectum is important, since the majority of cases, when referred for treatment, are unsuitable for radical surgical removal. The importance of palliative treatment should be more fully appreciated, since it means the disappearance or a decrease in the severity of symptoms, accompanied by an improvement in the general health, and a prolongation of life. In a small group of cases it means clinical arrest of the disease. The most valuable methods of treatment for inoperable carcinoma of the rectum are: (1) radiation therapy (application of radium and high voltage roentgen rays) and (2) the combined use of radiation therapy and palliative surgery.

In the Memorial Hospital, New York, radiation therapy constitutes the principal factor. A colostomy is carried out in all cases in which it offers an additional advantage. Occasionally a partial removal of the mass is done to facilitate more adequate application of radium. Radiation therapy is employed both externally and internally. The most efficient external application is the radium pack.

This contains four grams of radium element, or 2,000 to 2,500 millicuries of radium emanation. It is employed 10 or 15 centimeters from the skin. If this amount of radium is not available, high voltage roentgen rays may be substituted. The best results are obtained by the combination of radium and X-rays. Interstitial radiation by means of gold-filtered seeds is the method of choice. It is usually not employed until after the effects of external radiation are seen.

L. J. CARTER, M.D.

Factors that Influence Prognosis and End-results in Uterine Cancer. William P. Healy. New York St. Jour. Med., Feb. 15, 1930, XXX, 191.

The important factors that influence prognosis and end-results in uterine cancer are: (1) early diagnosis, (2) histologic characteristics of the tumor, (3) choice of treatment, (4) general constitutional condition of the patient. The prognosis and end-results in uterine cancer vary according to whether operation or radiation therapy is the method employed. In Grade IV cases, operation gives uniformly bad results, while efficient radiation therapy gives surprisingly good results, 60 per cent of the favorable cases of cervical cancer and 50 per cent of the uterine body cases remaining well five years or more. The Wertheim hysterectomy has a 15 per cent primary mortality in expert hands, which must be considered in choosing a method of treatment. In the author's series of cases no patient under the age of 30 years, with cervical cancer, survived for more than five years.

W. W. WATKINS, M.D.

GASTRO-INTESTINAL TRACT (DIAGNOSIS)

Hernia of the Stomach through the Esophageal Orifice of the Diaphragm. Max Ritvo. Jour. Am. Med. Assn., Jan. 4, 1930, XCIV, 15.

An "esophageal orifice hernia," as the term is used, is a protrusion of a portion of the fundus of the stomach through the esophageal opening in the diaphragm into the thorax. Ritvo reviews the cases in the literature and reports a series of sixty cases seen in a five-year period. The etiology, pathology, and symptoms are comprehensively reviewed. Fluoroscopic observations with the patient standing rarely demonstrate the hernia. The observations must be made with the patient in the prone, supine, and oblique horizontal positions. Deep inhalation and exhalation should be advised during the time of observation. Manipulation with the head of the table lowered, or a pillow placed under the buttocks, is an important maneuver. Some hernias are difficult to demonstrate by roentgenography. Treatment consists mainly of dietetic and preventive measures. Surgical intervention is indicated only if symptoms are severe.

C. G. SUTHERLAND, M.B. (Tor.)

Chronic Intestinal Obstruction of the Segmental Type: Further Studies in Omental Pathogenesis. John W. Draper and Redford K. Johnson. Jour. Am. Med. Assn., March 8, 1930, XCIV, 683.

That there is an analogy between experimentally produced segmental obstruction in dogs and congenitally produced segmental obstruction in man, is the feeling of the authors. Segmental obstructions of the colon are caused by variations in the omentum and peritoneum. Omental anomalies vary from dense and contractured fibrous bands to festooned and web-like investitures, the derivation of which is sometimes extremely difficult to trace. The roentgen diagnosis is difficult only in that it entails a great deal of repeated effort. Abnormal barium retention in the terminal ileum is not a universal finding in segmental colon obstruction. Variations are noted in the same individual at separate examinations. The element of pressure in the colon is paramount, producing ischemic tissue destruction. The permanent elimination by excision of the cause of abnormal pressure, namely, a malformed and diseased omentum, is necessary in order to obtain symptomatic and lasting relief. Experimental work shows that dilatation of the cecum follows partial obstruction of the rec-

tum and that dilatation of the duodenum follows partial obstruction of the terminal ileum. Clinical studies in man support these observations.

The necessity and end-results of surgery are stressed in the discussion by Jordan and Eusterman, the consensus of opinion favoring medical management.

C. G. SUTHERLAND, M.B. (Tor.)

Prolapse of Pedunculated Tumors and Gastric Mucosa through Pylorus into Duodenum. Eugene P. Pendergrass. Jour. Am. Med. Assn., Feb. 1, 1930, XCIV, 317.

In every case of unexplained anemia a careful roentgen study of the gastro-intestinal tract should be made. The author stresses the severe secondary anemia associated with ulceration of a prolapsed gastric mucosa or of pedunculated tumors. These conditions are readily diagnosed by roentgen examination. Pedunculated tumors that prolapse through the pylorus into the duodenum may be papillomas, adenomas, fibromas, or polyps. The majority in the author's series were papillomas or polyps. They arise from the mucosa near the pylorus, varying in diameter from 1 to 2 centimeters; the pedicles may be short or long; the tumors may be multiple or single. Considered as benign, malignant changes were found in seven cases and were suspected in several others. Duodenal stasis was observed in a number of the author's cases. The only clinical symptom was typical ball-valve type of pain. Many had no characteristic syndromes. Achlorhydria was a constant finding, and anemia in these cases simulated a primary anemia. Fluoroscopic and roentgenographic evidences are filling defect in the pylorus and a central filling defect in the duodenum. The pyloric defect is not seen in prolapsing tumors.

C. G. SUTHERLAND, M.B. (Tor.)

GENITO-URINARY TRACT (DIAGNOSIS)

Peroral Pyelography. Joseph Ziegler and Hans Köhler. Med. Klinik, January, 1930, XXVI, 10.

Rosenow has shown that sodium iodide combined with urea when injected intravenously will demonstrate the kidney pelvis, ureter, and bladder. The authors applied compression with an airbag over the area where the ureter crosses the pelvic rim, in order to get a denser shadow by preventing emptying of the kidney pelvis and ureter. The patient is given 8 to 10 gm. of sodium iodide and 10 gm. of urea in milk. Fifteen minutes later the compression bag is applied and maintained for thirty minutes. At the end of that time films are taken. The density of the shadow is less than that attained by "ascending" pyelography. However, introduction of the medium by cystoscopy can be avoided in many cases, and "descending" pyelography can be used when the "ascending" method is impossible or inadvisable (for instance, in cases of ureteral obstruction). There is a definite possibility of combining peroral pyelography with the kidney function test. Urea is used in this way by McLean. Further investigations in this direction are under way.

H. W. HEFKE, M.D.

Intravenous Urography by Means of Uroselectan. M. Swick. Am. Jour. Surg., February, 1930, VIII, 405.

In the work on this subject selectan neutral was first used. This was followed in many cases by headache, nausea, and vomiting, although the symptoms were not severe enough to prevent its use. In all cases, the urinary bladder was seen and the kidney parenchyma appeared to stand out more in relief. If the ureter were blocked below, the upper genito-urinary tract was outlined, although not very prominently. It was seen from such results that this drug would need modification to make it satisfactory. After some experimentation, uroselectan was finally obtained. It is non-toxic, readily soluble in water, neutral in its reaction, and, under normal conditions, excreted almost entirely as such through the genito-urinary tract within eight hours, suggesting the likelihood that no chemical reaction takes place in the body. The body tolerance is great, and from experiments on mice,

it is estimated that 180 grams could be theoretically administered to a 60 kilogram individual. From the results obtained it would appear that a normally functioning kidney possesses the ability to excrete this substance within a very short period. About three-fifths of the substance is excreted during the first two hours, about one-quarter during the next hour, and the remainder during the subsequent four hours. In order to obtain good outline of the kidney pelvis, there must be rapid excretion, with concentration of the solution, or if there is obstruction lower down, the excretion need not be so rapid. To evaluate the intravenous method of pyelography and to correctly interpret the results therefrom, it is of paramount importance to consider this method an excretory one, and to constantly bear in mind the processes occurring in the renal and extra-renal system, factors determining renal function. In addition to the anatomical data derived from this examination the function of the pelvis, ureter, and bladder also can be studied. For an adult, from 33 to 40 grams are dissolved in doubly distilled water to a volume of 100 cubic centimeters. This is then filtered and sterilized and injected with a syringe. The injection is done in two stages at intervals of from three to five minutes. The first X-ray examination is usually made about fifteen minutes after the last injection. The second, about twenty to thirty minutes after the first X-ray plate, and the third, a corresponding period after the second. The number of subsequent plates and the time at which they are taken depend upon the functional activity and derangement of the kidney. During the injection the patient experiences a transient thirst and generalized warmth, but few other symptoms are noted.

The method appears to work equally well with children or adults. The field of application is quite wide and its outlook would be for a rather general use. With this article a number of pyelograms, ureterograms, and cystograms obtained by using this method are published, excellent detail being obtained in many cases. The method gives every appearance of being a welcome addition to the roentgenologist's armamentarium.

HOWARD P. DOUB, M.D.

Proved Communication between the Left Ureter and the Small Intestine—Cause Undetermined: Case Report. Gerard Raap. Am. Jour. Roentgenol. and Rad. Ther., December, 1929, XXII, 560.

A case is reported, diagnosed roentgenologically and confirmed at necropsy, of proved communication between the ileum and urinary bladder. The exact origin was not determined but there was a history of an abdominal operation about ten years prior to death, shortly following which operation the patient developed a urinary fistula through the surgical wound. Only a little time after the abdominal opening had closed, the patient suddenly felt something "break loose," immediately after which he passed pus *per urethra* and ever after had frequent loose watery stools but rarely voided naturally.

J. E. HABBE, M.D.

Serial Pyeloureterography: Its Value in Medicine. Abraham Mattes. New Orleans Med. and Surg. Jour., February, 1930, LXXXII, 532.

The author refers to a method previously reported, in which a series of pyeloureterograms were made, taking four to six exposures to show the emptying time, as well as the outline of the pelvis and ureters. Over five hundred cases have been subjected to routine bilateral pyeloureterography, and an analysis of 140 of these cases showed stasis in 62, or 44 per cent.

W. W. WATKINS, M.D.

Roentgen-ray Shadow Resembling Renal Calculus Caused by Papilloma of the Skin. William Robert Delzell. Am. Jour. Surg., January, 1930, VIII, 103.

This is a case report in which a shadow of increased density was seen in the region of the right kidney. It was located just at the end of a catheter inserted into the right ureter, and lay over the shadow of the pyelogram of the kidney. At operation the stone could not be located in the pelvis of the kidney. Later a papilloma was removed from the patient's

back and this was found to have caused the shadow shown on the previous roentgenogram. A brief résumé of the literature is given.

HOWARD P. DOUB, M.D.

Acute Hematogenous (Metastatic) Perinephric Abscesses. Harold Brunn and George K. Rhodes. Jour. Am. Med. Assn., March 1, 1930, XCIV, 618.

The authors state that roentgen examination gives the first positive confirmatory evidence of perinephric abscess. A fluoroscopic examination may show a delayed excursion of the diaphragm, which is usually indicative of subphrenic disease. Roentgen films show an obliteration of the lateral border of the psoas muscle and an indefinite kidney shadow on the affected side. Early in the onset of clinical symptoms the roentgenogram may show indefinite changes in the psoas shadow. Repeated plates in the course of a few days will show disappearance of the psoas shadow. A diagnostic sign described is a scoliosis of the lumbar vertebra, with its convexity away from the affected side. Some believe this more important than the loss of the psoas muscle shadow.

C. G. SUTHERLAND, M.B. (Tor.)

Renal Tuberculosis. Gilbert J. Thomas. Jour. Am. Med. Assn., Jan. 25, 1930, XCIV, 229.

Pyelograms were found indispensable in the diagnosis of early lesions of tuberculosis and were of the greatest value in following the changes that may take place in the filling defects of the renal pelvis. Thomas reports a clinical and pathologic study at Glen Lake Sanatorium over a long period. Bilateral pyelograms should always be made, because bilateral lesions in his experience were found in as high as 57 per cent of cases. The early pyelographic filling defect, usually at the tip of a calix, may easily be overlooked. From the change in size and contour of the filling defect, resistance can be judged and treatment determined. The use of X-rays before injection has not been helpful.

C. G. SUTHERLAND M.B. (Tor.)

Roentgenography of the Female Genito-urinary Tract. Bram Eldering. Röntgenpraxis, January, 1930, II, 74.

A new contrast medium, iodenol, is described and considered to be superior to lipiodol, iodipin, or umbrenal for visualizing the tubes and urinary system. It is not an iodized oil, therefore much more stable. Its toxicity is somewhat less than that of the other substances, and in animal experimentation it does not show any irritation of the peritoneum or intestinal serosa. The intensity of the shadow is very good, and the viscosity of the medium is low enough to make possible an injection under comparatively low pressure. In eighty-four cases, no untoward reaction has been encountered.

H. W. HEFKE, M.D.

GENITO-URINARY TRACT (THERAPY)

Observations on Twenty-three Cases of Carcinoma of the Bladder Treated by Radium. A. Clifford Morson. Brit. Med. Jour., June 8, 1929, No. 3,570, p. 1038.

The consensus of opinion in Europe appears to be that malignant disease of the genito-urinary organs, apart from the penis, reacts unfavorably to radium treatment. In the majority of cases the method of surface application has been adopted in preference to what is termed the "surgery of access." Research on the treatment of bladder carcinoma by buried radium needles has been carried out by Dr. Morson at St. Peter's Hospital since 1925. Twenty-three cases of inoperable carcinoma have been so treated during this period, and kept under careful observation.

The radium technic which has been adopted is as follows: First a cystotomy is performed, and the extent of the growth determined by palpation. Five milligrams of the element, in platinum tubes 25 mm. in length and with a screenage of 0.5 mm., are then inserted 2 cm. apart into the periphery of the tumor on its mucous surface, and also on its external aspect. The tubes remain in position for from twelve to twenty-four hours. Each tube is threaded with silkworm gut, and at the termin-

ation of the period of exposure is easily withdrawn from the bladder through the suprapubic wound. The silkworm gut is used in preference to silk on account of its strength, there being less likelihood of its being torn when pulled on.

The results of treatment were very encouraging, in view of the fact that before treatment was commenced, all twenty-three patients were profoundly ill, either from sepsis or profuse hemorrhage. It was concluded that in all cases of carcinoma of the bladder hemorrhage can be controlled by irradiation, but in the presence of severe cystitis the prognosis is always bad. One can expect improvement both in the general state of health, with increase of weight, and in the local condition for six months after the radium exposure.

WALLACE D. MACKENZIE, M.D.

The Uses and Limitations of the X-rays in Urology. J. D. Morgan. Penn. Med. Jour., January, 1930, XXXIII, 217.

This paper, presented in the symposium on urology before the Medical Society of the State of Pennsylvania, discusses the value of roentgenographic methods in urinary stones, the technic of examination, and differential points in considering other possible causes for shadows. In the bladder region, shadows may be caused by scybala, intestinal calculi, foreign bodies in the intestine or bladder, calcification in the walls of the pelvic arteries, phleboliths of the pelvic veins, calcification in retroperitoneal glands, foreign bodies in vagina or uterus, calcification of uterine myoma, dermoid cysts, etc., as well as by calculi in lower ureter or bladder. In examining for bladder tumors, he advises examination, first, with bladder distended by air, and then with it filled with some opaque medium.

W. W. WATKINS, M.D.

Renal Tumors: A Brief Review of a Series of Cases from the Department of Urology, Royal Victoria Hospital. David W. MacKenzie and Gerald A. Parkins. Jour. Can. Med. Assn., June, 1929, XX, 616.

This is a review of 56 cases—13 benign and 43 malignant—passing through the Department of Urology, Royal Victoria Hospital, Montreal. The benign tumors numbered 8 cysts, 2 papillomas, 2 fibromas, and 1 hemangioma. Of the malignant tumors, 27 were operated on. The diagnosis was not difficult in 37 of the 43 cases. Pyelography offered the most important single diagnostic aid, by showing deformities of the pelves and calices. Similar deformities may be produced by hydronephrosis, extensive pyonephrosis, blood clot, and calculi, but the history, physical examination, and other cystoscopic findings will generally permit the correct diagnosis to be made. Metastases to lungs and liver were present in 8 cases. The treatment consisted in nephrectomy, with removal of the involved regional lymph glands. Radium and deep X-ray therapy are advised only as adjuvants.

The results are not encouraging. Of the 27 patients operated on, 9 are known to be dead, while 8 are known to be alive.

L. J. CARTER, M.D.

MASTOID

When shall we Operate upon the Infant Mastoid? Eugene Rosamond. South. Med. Jour., January, 1930, XXIII, 35.

In detecting the signs of mastoiditis in infants, the X-ray is regarded as less accurate than it is in adults, because of the imperfect bone development. However, the roentgenographic examination has been of value, in this author's opinion, in guiding the surgeon, as at least one infant in three will show a surprisingly large mastoid development. The infant should either be anesthetized or a "flash" technic used in making the roentgenograms.

W. W. WATKINS, M.D.

Roentgenologic Studies of Mastoid in Infants. Charles L. Martin. Am. Jour. Roentgenol. and Rad. Ther., November, 1929, XXII, 431.

Infants over six months of age will usually show some cellular development in the mastoid processes, while many children of only a

few years will show mastoid structures of the approximate size and development of an adult. In patients of nine months, or over, reliable information as to the presence or absence of a mastoiditis is usually obtainable on good films, if the infection is unilateral, but in bilateral disease it is very difficult to say definitely that pathology exists, since different patients show very different degrees of mastoid development at the same age. The author's technic requires three assistants completely to immobilize the infant, and the external ear is strapped snugly to the cheek with adhesive plaster, after which films are taken using the Law position and a machine setting requiring only 1/8 second exposure.

J. E. HABBE, M.D.

The Diagnosis and Management of Acute Mastoiditis. James E. Brayshaw. Del. St. Med. Jour., January, 1930, II, 6.

Otologists usually make their diagnosis of acute mastoiditis on other findings mentioned, but the X-ray yields useful information. Both the anatomical relations and the pathological changes may be shown by the X-ray—whether the mastoid cells are of the diploic type, or, if developed, whether the cells are large, small, medium, or mixed, or, finally, whether they are of the sclerotic type. The earliest sign is a "peppering" of the cells; then the sharpness and clear definition are lost, giving the appearance of being out of focus; finally the intercellular walls thin out and become absorbed. The location of the lateral sinus is often important.

(*Note:*—By some otologists this is regarded as of prime importance, and at least one, to the reviewer's personal knowledge, will never attempt a mastoid operation without having the lateral sinus located by the X-ray.)

W. W. WATKINS, M.D.

OFFSPRING, EFFECT ON

X-ray Injuries of the Male Germ Cell and Offspring. Lothar Loeffler. Strahlentherapie, 1929, XXXIV, 735.

The therapeutic use of roentgen rays entails a number of dangers: electric shock, exposure of the operator, over-exposure of the patient, and the occurrence of late reactions. The most serious of all the undesirable effects, however, is, without doubt, the possibility of injuries to the offspring, following irradiation of either parental testicle or ovary. While a considerable literature has accumulated concerning changes in children whose mothers had been irradiated before or during pregnancy, relatively little is known as to the influence of roentgen rays on future offspring in cases of irradiated fathers. The author decided, therefore, to conduct a questionnaire among male persons dealing professionally with roentgen rays, namely, radiologists, physicists, X-ray engineers, and technicians. He believes that the study of the influence of roentgen rays on the male parent is preferable for obtaining an accurate answer to the problem, since most irradiated women have not normal sexual organs. As a matter of fact, they receive X-ray treatment because of some disease in the genital tract. In most cases where one large or several small fields are used, not only the ovaries but also the uterus and the oviducts absorb radiation. It is also more probable that in the ovum the plasmatic part of the germ cell may be injured and so be responsible for changes in the offspring. This possibility is exceedingly small in the case of the male germ cell. The questionnaire was mailed to 200 persons, and 141 replies were received. Of the 108 physicians and 33 technicians, 83 and 28 answers, respectively, could be used in the statistics. While the details have to be looked up in the original, some of the conclusions are given here. There is no doubt but that we have enough experimental proof of the possibility of X-ray injuries to the next generation in irradiated plants and animals; the positive proof in man has not been furnished so far. As to the questionnaire, it must be stated that no phenotypical injury has been detected in children of men working with roentgen rays. The number of abortions in the wives of these workers is very small. The number of children in each marriage is approximately 1.5 child, as compared with 2.5 children averaged out of 284 marriages of university professors. Thirty-one

per cent of the marriages of X-ray workers remained sterile; in 18 per cent changes of the sperma could be detected. In seven cases, children were born following recovery from a temporary injury to the sperma. Therefore, in view of the results of animal experiments, the author urges that the utmost caution be employed in the roentgen irradiation of human germ cells. He emphasizes that it would be rather improper to wait until definite proof has been furnished as to injuries of the human offspring.

E. A. POHLE, M.D., PH.D.

Etiology of the Ill-health of Children Born after Maternal Pelvic Irradiation. Part I.—Unhealthy Children Born after Preconception Pelvic Irradiation. Douglas P. Murphy and Leopold Goldstein. Am. Jour. Roentgenol. and Rad. Ther., September, 1929, XXII, 207.

The cases of 46 unhealthy children from a series of 415 pregnancies, following the administration of preconception radiation therapy, were studied in an effort to determine the relation between the irradiation and the child's ill-health. Any child was classified "unhealthy" who was stillborn, prematurely born, born at term with demonstrable abnormality, who at any time after birth was affected with any disturbance of health or growth, or who had died from any cause whatever. One in every 11 cases having preconception irradiation showed some abnormality, but in slightly more than half of the total number the abnormality could be definitely attributed to such circumstance as maternal ill-health, complications of labor, accidental causes, etc. Only one child in 59 showed some gross anatomic defect of unknown origin. Because of such a low percentage the authors feel that there must have been other etiologic factors than the radiation applied, otherwise the defects would have occurred with greater frequency, regularity, and uniformity.

J. E. HABBE, M.D.

Etiology of the Ill-health of Children Born after Maternal Pelvic Irradiation. Part II.—Defective Children Born after Post-conception Pelvic Irradiation. Leopold Goldstein and Douglas P. Murphy. Am. Jour. Roentgenol. and Rad. Ther., October, 1929, XXII, 322.

The etiology of the ill-health or defects shown by 38 children in a group of 75 who had received therapeutic radium or X-radiation while *in utero* was investigated. Twenty-eight of the 38 abnormals showed conditions which could not be attributed to parental influence or any cause other than the irradiation. Of these 28, 20 showed marked central nervous system defects, most of them being microcephalics. Such a defect may occur from therapeutic irradiation late as well as early during pregnancy. Due to the high percentage of abnormals occurring with such a high degree of uniformity, the authors believe post-conception therapeutic irradiation to constitute a serious menace to the future development and health of the fetus, but reiterate the opinion offered many times before that diagnostic irradiation of the pelvis is not harmful to the health of the subsequent child.

J. E. HABBE, M.D.

PELVIS (THERAPY)

Indications for the Use of Radiation in Diseases of the Female Pelvis. W. S. Lawrence. Jour. Tenn. St. Med. Assn., January, 1930, XXIII, 17.

Two groups of conditions are discussed: first, those in which radiation is positively known to be of great value, such as carcinoma of the cervix, excessive hemorrhage near the menopause, fibroid tumors in women past the age of thirty-eight, menorrhagia and metrorrhagia in young women, and hypertrophy at the cervix, with diseased cervical glands; second, infantile uterus, amenorrhea, and sterility. With regard to carcinoma of the cervix, all cases should have *both* X-ray and radium. Uncomplicated fibroids in women past the age of thirty-eight should be treated by radiation and not by surgery. In the cases of menorrhagia and metrorrhagia in young women, good judgment is required but many

can be successfully treated by radiation without permanent amenorrhea. In regard to the second group, the work of Werner is cited, reporting the cases of young amenorrheic women in considerable numbers who have been treated, with resultant stimulation of ovarian function. In many instances pregnancy resulted, ending in full term labors. The author is conservative in his comment but thinks the work is well worth investigation and trial.

W. W. WATKINS, M.D.

Fluorescence in the Female Genital Organs. Heinz Hauser. Strahlentherapie, 1929, XXXIII, 582.

The vulva of women with uterine bleeding was examined with ultra-violet rays of the wave length lambda 3660 Ångstroms. A brilliant red fluorescence was seen, to such an extent as never observed under normal conditions anywhere else on the body. The substance which evidently caused this fluorescence was soluble in a hydrochloric acid-alcohol solution. It kept for a considerable time. The neutralized solution of that substance in methyl alcohol had a photodynamic effect, as shown in experiments on paramecium and erythrocytes. It is possible that the substance belongs to the group of porphyrins and is produced by bacteria living on the vulva.

E. A. POHLE, M.D., PH.D.

Acute Fractures of the Pelvis: Treatment and Results in One Hundred and Twenty-five Cases. Lloyd Noland and H. Earle Conwell. Jour. Am. Med. Assn., Jan. 18, 1930, XCIV, 174.

The authors believe that these fractures, if treated properly, conservatively, and rigidly, will yield as brilliant end-results as those secured in any other major fracture. Excellent functional results are frequent in cases in which good anatomic position is by no means secured. Seventy-one cases followed industrial accidents, and fifty-four were caused by various other casualties. Seventy-five per cent of pelvic fractures in women were the result of automobile accidents. A comprehensive discussion of apparatus and methods of treatment is given.

C. G. SUTHERLAND, M.B. (Tor.)

The Pre-radium Treatment of Uterine Cervical Malignancy. Harold Swanberg, Ill. Med. Jour., January, 1930, LVII, 26.

Three phases of preliminary treatment are discussed: (1) External radiation by high voltage X-ray or radium at a distance, in all cases of parametrial involvement; (2) Treatment of infection before using radium; (3) Removal of exuberant vaginal growths by preliminary radium or electro-thermic methods before using the main radium applications. The technic advised is chiefly that of Regaud.

W. W. WATKINS, M.D.

Hysterosalpingography: Description of Special Pressure Apparatus and Technic. Samuel A. Robins. Am. Jour. Roentgenol. and Rad. Ther., December, 1929, XXII, 573.

If hysterosalpingography is done with care and under strict aseptic technic, it need not be a dangerous or even painful procedure to the patient. The author uses a bivalve speculum with aluminum blades in order not to obscure the outline of the cervical canal. Probing with a uterine sound to determine depth of cavity and to displace tenacious mucus and effect the aspiration of mucus or other secretion is performed prior to injection of the iodized oil. A pressure of over 220 mm. Hg is never used. All of the instruments used in the procedure are illustrated.

J. E. HABBE, M.D.

Experience with the Roentgen Treatment of Pelvic Inflammatory Disease. Franz Seisser. Strahlentherapie, 1929, XXXIII, 471.

Two hundred eight cases of pelvic inflammatory disease were observed over a period of one year. Repeated small doses of roentgen rays, which are most suitable for genital

tuberculosis, are also recommended in the treatment of inflammatory diseases of different etiology. The majority of cases respond well to semi-sterilization, that is, the application of a full sterilization dose to one ovary only. Women close to the climacteric may be completely sterilized. In rare cases, as, for instance, very severe chronic types of parametric involvement, higher doses may be justified.

E. A. POHLE, M.D., PH.D.

RADIUM

What should be the Properties of Radium Carriers? Albert Fernau. Strahlentherapie, 1929, XXXIV, 855.

The author describes a method for the conversion of radium preparations and for the making up of a plaque which avoids almost entirely the loss of radium element.

E. A. POHLE, M.D., PH.D.

On the Intra-uterine Radium Application. St. Simon. Strahlentherapie, 1929, XXXIV, 859.

The author describes an intra-uterine applicator which has proved to be of advantage in the treatment of intra-uterine carcinoma.

E. A. POHLE, M.D., PH.D.

Studies on the Cause of Radium Reaction in Normal and Diseased Human Skin. Leopold Freund. Strahlentherapie, 1929, XXXIV, 767.

In 1916, the writer for the first time published his studies concerning the radium reaction on human skin following exposure to radium-mesothorium. He took up this problem again, using a circular radium plaque of 17.75 milligrams, 3.1 centimeters square surface, 0.1 mm. mica and 0.2 mm. silver filtration, in preference to roentgen rays, to assure the constancy of the source of radiation. Forty minutes were considered as equivalent of an erythema dose. An improved erythema and pigdegree of reddening or tanning. On normal mentation scale in arbitrary units indicated the human skin, the erythema curve had one maximum, corresponding to the second or principal reaction, provided the exposure had been given in one sitting. Following fractional doses of the same total amount as given in one sitting produced a lower reaction. The curve was flattened out as compared with the curve in the first experiment. There were also differences in the reaction, depending upon the individual, the location, and the time of exposure. A comparison between erythema, pigmentation, and therapeutic results in psoriasis demonstrated that there was a definite relation between the erythema and the healing of the skin affection independent of the pigmentation. Tables and curves illustrate the results in detail.

E. A. POHLE, M.D., PH.D.

Small and Large Quantities of Radium in the Treatment of Malignancy of the Mucous Membranes. Frank Edward Simpson and Roy Emmert Flesher. Ill. Med. Jour., January, 1930, LVII, 26.

Every cancer of the mucous membranes is potentially fatal. Radium treatments for cancer, at least in cases of advanced cancer, should be carried out as an institutional problem. The technic of radium treatment is very complex, and only long and varied experience in applying the right kind of treatment to different cases can result in the greatest good. Homogeneous radiation with large quantities of radium is advocated.

W. W. WATKINS, M.D.

Value of Radium in the Treatment of Malignant Growths of the Face. A. James Larkin. Am. Jour. Surg., January, 1930, VIII, 164.

Probably the most common malignant lesion of the face is the rodent ulcer or basal-celled carcinoma. This is rather slow growing but is usually radiosensitive and can be removed by appropriate radium treatment in a very high percentage of cases. Squamous-celled carcinoma is less common, grows more rapidly,

and may metastasize more frequently. It is somewhat more radioresistant than the basal-celled epithelioma. These lesions, however, respond with fair satisfaction to appropriate radium treatment, but those not yielding to the first or second application should have careful consideration in regard to surgical removal. Lesions involving the nose or ears to such an extent that the cartilage is involved, require mechanical removal. The superficial lesions involving these areas, however, respond to surface radium treatment. Many of these cases of malignancy of the face can be removed by surgery or electrocoagulation, but, in general, skin malignancies of the face can be handled with radium, and the percentage of permanent cures is higher in the larger radium clinics than is obtained by other methods elsewhere.

HOWARD P. DOUB, M.D.

Radium—a Warning. C. Thurstan Holland. Brit. Jour. Radiol., November, 1929, II, 501.

The writer, himself a F.R.C.S., while admitting that surgery with some reservations is a ghastly failure in the treatment of malignant diseases, believes that the term "cure" should never be used until some more perfect means of dealing with the general as well as the local manifestations is evolved. The results of the most recently published articles from Sweden, France, England, and the United States are quoted to show that with newer radium technics, improved results are being obtained, but to speak of the "radium cure" for malignancy is only to mislead the public and produce an aftermath of disappointment.

J. E. HABBE, M.D.

ROENTGEN THERAPY

Radiation Therapy of Tonsils. Leila C. Knox. Jour. Am. Med. Assn., March 8, 1930, XCIV, 705.

The proper sphere for both surgery and the X-rays is judiciously considered by Knox. A review of the end-results in various groups of tonsillectomies showed limitations in therapeutic results. In general, roentgen irradiation of the tonsils should not replace tonsillectomy in the rheumatic child, whether with or without endocarditis, but it may be substituted with benefit in those patients who, because of some complications, or because of the severity of their cardiac condition, are not proper subjects for operation. Radiation is useful in the treatment of recurrent tonsils and adenoids, hypertrophic pharyngitis, and bronchitis of both children and adults. The pathologic conditions most amenable to radiation are chronic hyperplasia, whether simple or on a known infectious basis, chronic interstitial tonsillitis (only rarely), and chronic atrophic tonsillitis associated with chronic hypertrophic glossitis or pharyngitis. Elderly persons with chronic or recurrent sore throats are usually rendered more comfortable, and the frequency and severity of their colds are diminished for a period of at least several years. Radiation is contra-indicated in acute follicular tonsillitis, sepsis, acute leukemia, even with tonsillar masses, mononucleosis, Vincent's angina, syphilis, diphtheria, scarlet fever, or abscess of any type, and acute sinusitis.

C. G. SUTHERLAND, M.B. (Tor.)

The Roentgen Treatment of Chronic Paronychia. Richard Rohrbach. Strahlentherapie, 1930, XXXV, 136.

In the author's experience, X-ray therapy of chronic paronychia has proved to be the best method. Technic: 12 X through 2.0 Al. (may be repeated after six weeks). In case of recurrence, treatment is permissible again after from three to six months. It is important to protect all normal skin and confine the exposure to the diseased area.

E. A. POHLE, M.D., PH.D.

The Results of Radiation Therapy of Uterine Fibroid and Hemorrhagic Metropathy. Ernst von Ammon. Strahlentherapie, 1929, XXXIV, 457.

The author has collected the literature concerning the radiation therapy of uterine fibroid and uterine bleeding of non-malignant

origin, during the years 1922 to 1927. The very detailed report accompanied by many tables and statistics should be looked up by every physician interested in the subject. The following conclusions represent the interpretation of the collected material. Based on 15,000 cases recorded in the literature, it appears that radiation therapy of uterine fibroid and hemorrhagic metropathy cures 96 per cent of all cases. The mortality is 0.1 per cent, while the percentage of failure is 3.9 per cent. It is stated that surgery, in spite of all improvements in operative technic, can never attain such a low mortality figure. An accurate diagnosis and precise indications combined with exact dosage may permit even a higher percentage of cures in radiation therapy. An extensive bibliography offers references to the articles used in the study.

E. A. POHLE, M.D., PH.D.

X-ray Treatment of the Head in Serious Cases of Serous Ependymitis. Paolo Nichelatti. Minerva Med., Dec. 8, 1929, IX, Pt. 2, p. 925.

The author states and evaluates the ocular and neurologic symptoms in the diagnosis of serous ependymitis. He points out the importance of the manometric tests of the cephalorachidian liquid. He mentions, further, three serious cases of this disease which were successfully treated by roentgen radiation of the head, and corroborates the preferability of this method to surgical intervention.

L. MARINELLI.

Thallium Epilation or Roentgen Epilation. H. Ritter and C. L. Karrenberg. Strahlentherapie, 1930, XXXV, 116.

The authors review the literature on epilation by thallium or by roentgen rays. Their own experience supports the conclusions that the thallium therapy can not be recommended at all, particularly because of the high percentage of failures and of the possible toxic effect. Careful roentgen epilation is, therefore, the method of choice in the treatment of mycosis of the scalp.

E. A. POHLE, M.D., PH.D.

SKIN (THERAPY)

The Treatment of Lupus Vulgaris. Wilhelm Brandt. Strahlentherapie, 1930, XXXV, 149.

Contribution to the Statistics of Surgical and Finsen Treatment of Lupus Vulgaris. Anton Kropatsch. Strahlentherapie, 1930, XXXV, 158.

The first paper is a report of 349 cases of lupus vulgaris: 34.4 per cent were cured, 12.9 per cent improved, and 52.7 per cent remained uninfluenced. The principal method of treatment was exposure to the quartz mercury vapor lamp. X-ray therapy is not recommended, particularly because of the danger of late reaction; it is also not very effective. The longer the interval between the onset of the symptoms and the beginning of the treatment, the less response is observed.

Kropatsch analyzed 554 male and 778 female patients who were treated in the Lupus Hospital, in Vienna. Between 1920 and 1927, 473 cases were operated on, 196 of which could be followed up. Only 6.1 per cent had a recurrence. The Finsen therapy (carbon arc light exposure) takes much longer than surgical removal of the lesions. It is also questionable if all the diseased tissue is really destroyed. However, it is undoubtedly the best method in the field of light therapy for the treatment of lupus vulgaris.

E. A. POHLE, M.D., PH.D.

The Histology of Sensitized Irradiated Skin. H. G. Bode and E. Riecke. Strahlentherapie, 1930, XXXV, 265.

It has been known for many years that the effect of roentgen rays on the skin can be enhanced by a preceding ultra-violet exposure, application of heat or of certain chemicals as, for instance, tincture of iodin. In this paper, the authors study the question as to whether there are histological changes explaining these observations. White guinea pigs and rabbits were used in the experiments. The hair was carefully removed from the backs of the guinea pigs and the upper thighs of the rabbits. Two days later, three guinea pigs were paint-

ed with tincture of iodin in the morning and evening on three successive days; on the fourth day, the painted area was irradiated and also a neighboring area of normal skin on the same thigh, 957 r of unfiltered roentgen rays corresponding to a half value layer of 0.6 mm. Al being applied. One animal was exposed on the third day, another on the fifth day after the last iodin application. The experiments with chrysarobin and croton oil were carried out in the same manner. Two white rabbits received, at 10 A. M., 0.275 grams of myosalvarsan per kilogram body weight by intravenous injection. At 6 P. M. each animal received an X-ray dose corresponding to the one described above. Macroscopically, there was no difference between the reactions in the areas which were irradiated only or treated by the combined measures. An increased reaction was noted in only one rabbit which had received salvarsan. In all animals, biopsies were taken eight days following the exposure. Pieces of only sensitized skin, or sensitized and irradiated skin, and only irradiated skin were examined microscopically. Histologically, it appeared that in all cases the changes in the sensitized irradiated skin were considerably more pronounced than in the skin treated by one agent alone. Identical observations could be made in the rabbits injected with salvarsan. Detailed protocols and photomicrograms of the typical histological findings facilitate the study of this article.

E. A. POHLE, M.D., PH.D.

X-ray Treatment of Burns of the Human Skin. Ch. Tamiya and Masamichi Koyama. Strahlentherapie, 1929, XXXIV, 808.

Thermic and chemical burns of the human skin were treated with roentgen rays. The patients usually came to the X-ray laboratory a few days following treatment by ointment or moist dressings which had not improved the condition. Technic: 80 K.V. effective (0.13 Å.), 4.5 ma., 1 mm. Al, 30 cm. F.S.D., 1–3 H (12–36 per cent E.D.), 1 min. 18 sec. to 3 min. 54 sec. exposure time. Based on the observation of thirteen cases of thermic and two cases of chemical burns, the authors conclude that the most striking effect is the quick decrease of the spontaneous as well as the tactile pain. The inflammatory processes are also influenced, a fact which manifests itself by the disappearance of the reddening and swelling, an early drying of the corium, and a quick resorption of the content of the vesicles. It is probably also of advantage that this method does not require frequent changes of the dressings.

E. A. POHLE, M.D., PH.D.

Skin Disturbances in a Case of Chronic Myelogenous Leukemia Following Exposure to Roentgen Rays. Adam Grosglik. Strahlentherapie, 1929, XXXIII, 498.

The history is related of a woman twenty-nine years of age who had had lues nine years previous to admission and developed myelogenous leukemia. Two days following irradiation of the spleen with moderate doses of roentgen rays, she developed painful swellings on the right lower thigh, and then also on the left upper thigh. At the same time there was considerable pruritus over the entire body. The possible causes of this phenomenon are discussed at length.

E. A. POHLE, M.D., PH.D.

Our Experience with Indirect Roentgen Therapy in Skin Diseases. H. Fuhs and J. Konrad. Strahlentherapie, 1930, XXXV, 239.

In recent years, the indirect roentgen treatment of skin diseases has been advocated by a number of physicians. The authors gave this method a trial, with the following technic: Radiations of a half value layer in copper of from 0.17 to 0.22 millimeter, or from 0.4 to 0.47 millimeter, corresponding to 130 K.V., 3 to 4 mm. Al or 0.3 to 0.5 mm. Zn, plus 1.0 Al, were used. The average dose amounted to from 100 to 200 r. The thymus, hypophysis, thyroid, and the sympathetic nervous system were irradiated. Sometimes the spleen and liver were exposed following the technic of Thedering. Twenty cases of psoriasis, six cases of scleroderma, one case of vitiligo

(thymus exposed); twenty-seven cases of acne, eleven cases of alopecia, four cases of chronic eczema, one case of lichen, one case of psoriasis, eight cases of pruritus, three cases of urticaria (hypophysis exposed); six cases of chronic eczema, twenty-two cases of lichen, one case of Raynaud's disease, one case of pemphigus, seven cases of pruritus, three cases of scleroderma (sympathetic nervous system exposed); eight cases of lupus, seven cases of psoriasis, three cases of urticaria, two cases of strophulus infantum (spleen or spleen and liver exposed), and three cases of lupus erythematosus (regional lymph glands exposed), were observed. Based on a total of 157 patients, they came to the conclusion that the results of this indirect therapy were most disappointing, and, therefore, the direct exposure of skin lesions must be given the preference. Only in cases where there is apparently a definite relation between skin disease and the endocrine system, does the indirect treatment seem justifiable.

E. A. POHLE, M.D., PH.D.

Our Radiation Therapy of Skin Diseases. Walther Schultze and August Menz. Strahlentherapie, 1930, XXXV, 220.

This is a detailed account of the use of natural sunlight in the skin clinic of the University of Giessen. Combined with prolonged soap bath in certain cases or with boric acid or salt dressings in others, the results with heliotherapy were gratifying in cases of seborrheic eczema, universal eczema of children, pityriasis rosea and versicolor, lichen, psoriasis, pruritus, ichthyosis, and slow healing wounds. In alopecia areata, erysipeloid, and acne, the quartz mercury vapor lamp has been helpful. Emphasis is laid on the fact that artificial sources of light should be used only if sunlight is not available.

E. A. POHLE, M.D., PH.D.

Some Unusual Therapeutic Uses of X-ray. B. E. Rhudy. Sou. Med. and Surg., January, 1930, XCII, 17.

One of the greatest fields of usefulness of the X-ray is in diseases of the skin. Those who are skeptical should give the local roentgenologist a fair opportunity to treat some of these conditions. Acne vulgaris, eczema, tinea barbæ, sycosis vulgaris, verruca, furuncles, carbuncle, keloids, hyperidrosis, bromidrosis, pruritus, psoriasis, senile keratosis, and basal-cell epithelioma are all discussed. Chronic bone and joint diseases, simple adenitis, tuberculous adenitis, leukemias, prostatic diseases, and gynecologic conditions are also mentioned.

W. W. WATKINS, M.D.

Further Indications for the Bucky Rays in Dermatology. Herbert Fuhs and Josef Konrad. Strahlentherapie, 1929, XXXIII, 479.

Twelve cases of rare skin diseases are reported by the authors, which they treated by roentgen rays produced at about 8 K.V. (half value layer in aluminum equal to 0.0292 mm. Al). The cases were distributed as follows: morbus darier (1), ichthyosis atypica palmaris (1), pityriasis lichenoides chronica (3), varioliformis acuta (1), poikilodermia vascularis (Jakobi) (1), Spiegler tumors (3), Nicolas-Durand-Favre's disease (2). All cases responded very well following local irradiation. It is emphasized that in one patient even after application of 4,500 r-units, no injury to the skin could be detected after six months.

E. A. POHLE, M.D., PH.D.

Skin Tolerance Dose and Quality of Radiation. A. Reisner and Th. C. Neeff. Strahlentherapie, 1929, XXXIV, 313.

The relation between the quality of roentgen rays and the number of r-units required to produce identical erythema reactions on the human skin is not yet established. In this article, another group of investigators report their extensive studies, which have been carried out on the skin of the thighs of women. They have come to the following conclusions: the amount of roentgen radiation corresponding to a skin tolerance dose runs parallel with the ionization as far as 0.3 mm. half value layer in copper (2 cm. by 2 cm. field) or as far as 0.2 mm. half value layer in copper (6 cm. by 8 cm. field). From here on, the number of

r for the tolerance dose drops with increasing wave length. The use of small doses for the comparison of different wave lengths may lead to erroneous results because differences in the reactions disappear. If tolerance doses or even higher doses are used, the preponderance of the reactions following irradiation with longer wave length becomes apparent. The authors believe that their results explain, perhaps, some of the discrepancies existing between results obtained by different investigators. The r-unit used in their experiments is based on measurements with the Küstner instrument. The study of this paper in the original is recommended.

E. A. POHLE, M.D., PH.D.

The Treatment of Skin Diseases by General Body Exposure with Small Doses of Roentgen Rays. Herbert Fuhs. Strahlentherapie, 1929, XXXIV, 862.

Forty-four patients suffering from various skin diseases, for instance, furunculosis, eczema, psoriasis, urticaria, prurigo, and others, were exposed to roentgen rays over the entire body, with good results in 70 per cent of the cases. Usually from one to three series of treatments were given. They received an anterior field on the first and fifth day, a posterior field on the third and seventh day, with a second series following on the ninth day, and, if necessary, a third series beginning on the twenty-second day. Technic: 130 K.V., 4 mm. Al, half value layer in copper 0.22 mm., 15 r, the central ray focused over the center of the body at 130 cm. F.S.D. Since there were no undesirable reactions, this method is recommended in similar cases.

E. A. POHLE, M.D., PH.D.

TUMORS (DIAGNOSIS)

Roentgenologic Observations on Benign Tumors of the Stomach, with a Report of Fifteen Cases. Leo G. Rigler. Am. Jour. Surg., January, 1930, VIII, 144.

The author is of the opinion, from his own and others' experience, that these tumors are very much more common than was formerly supposed. Almost one thousand cases of this condition have already been reported in the literature. These tumors may produce very marked symptoms, resulting in incapacity of the individual, or they may undergo malignant degeneration, and are probably the origin of many cases of polypoid gastric carcinoma. Their surgical removal, in most cases, is comparatively simple and the end-results are excellent. These benign tumors may be classified pathologically as follows: multiple polyposis, angioma, myoma, fibroma, papilloma, polyp, fibromyoma, cysts, hypertrophied mucosa, and several other very rare types. The symptomatology depends obviously upon the size, multiplicity, location, and character of the tumor, and as to whether or not ulceration is taking place. In general the symptoms are due to hemorrhage, obstruction, ulceration, or disturbance of gastric function. The physical signs are essentially negative. The laboratory findings are also inconsistent. Achylia gastrica may occur, especially in the cases of generalized polyposis. Secondary anemia is also frequently found, and blood may be present in the gastric contents. The differential diagnosis must be made from carcinoma, ulcer, gastritis, pernicious anemia, and functional dyspepsia.

The roentgen examination with the barium meal is by far the best method of establishing the diagnosis. Following are the principal findings in this examination: (1) A filling defect which is usually central, round or oval, sharply outlined, and smooth in contour. (2) Peristalsis passes through the gastric walls in the region of the defect. (3) The gastric walls are flexible in the region of the tumor. (4) The defect itself is frequently movable. (5) A pedicle may be demonstrated. (6) The defect may appear in the duodenal bulb if the tumor prolapses through the pylorus. (7) The lumen of the stomach is not decreased in size. (8) Pyloric obstruction with six-hour gastric retention may be present. (9) In cases of polyposis the barium shadow of the stomach may show numerous small defects resembling a sponge. (10) In cases of hypertrophied gastric mucosa, the defects may appear as ridges of exaggerated type. (11) The rugæ

above and around the tumor may be unaffected. The examination is made by having the patient take a few swallows of barium and then, by palpation of the stomach, the physician visualizes the entire contour of the stomach walls. Examination must be made in both the upright and prone positions. It should be borne in mind that benign tumors may be present in association with other pathological conditions, especially carcinoma.

The author reports thirteen cases of benign tumors, two cases of benign polypi with malignant degeneration, and four cases of hypertrophic gastritis verging on polyposis.

HOWARD P. DOUB, M.D.

TUMORS (THERAPY)

Experience with Thorium X Seeds. Karl Hoede. Strahlentherapie, 1930, XXXV, 290.

In 1923, Halberstaedter recommended seeds made of thorium X for implantation into tumors. The author reports in this article five cases of skin malignancy which had not responded to other therapeutic agents but were benefited by this method. A tuberculous fistula and a hemangioma of the nose were also improved.

E. A. POHLE, M.D., PH.D.

The Combination of Isamin Blue and Radiation Therapy in Malignant Tumors. Hermann Bernhardt. Med. Klin., January, 1930, XXVI, 83.

Radiation therapy alone has not fulfilled the hopes for a perfect treatment of malignant tumors. Improvement can come, not by increasing the intensity of radiation, but by a combination of radiation with measures which bring the entire organism into a better state of reaction. Isamin blue, which has been used by the author in over two hundred cases, seems to give promise in this direction. It is almost non-toxic and allows patients to be subjected to radiation therapy who otherwise would not have been able to undergo a sufficient course of radiation. An activation of the reticulo-endothelial system and of the peritumorous tissue, apparently for the purpose of better defense, seems to be the explanation of its action. Intravenous injection of isamin blue alone in advanced cases in which even radiation therapy is contra-indicated, still brings about definite general improvement. The combination of isamin blue and radiation therapy, however, is in most cases the treatment of choice.

H. W. HEFKE, M.D.

The Roentgen-ray Treatment of Intrathoracic Tumors. William A. Evans and T. Leucutia. Am. Rev. Tuberc., January, 1930, XXI, 70.

The authors call attention to the fact that the same general rules must follow in treating tumors as in radiation therapy in other parts of the body. The radiosensitivity of the tumor and the reaction of containing and surrounding tissues enter into the determining result. Structures within the chest have a tendency to develop tumors of high radiosensitivity, especially those arising within or from the mediastinum. Likewise, metastatic tumors to the lungs, because of copious blood supply, are more sensitive to radiation, and the tendency of the lung to form connective tissue further assists in control of the tumor.

The authors give a general classification of tumors arising in the chest, according to their susceptibility, stating, in general, the results that may be expected in each. The majority of those arising within the thorax are sensitive to radiation.

A description of treatment technic is given and the use of colloidal lead in conjunction with radiation is advised in some cases.

S. C. BARROW, M.D.

A Rational Method of Procedure in the Irradiation of Malignant Tumors. L. R. Sante. Am. Jour. Roentgenol. and Rad. Ther., January, 1930, XXIII, 57.

Effects of irradiation of malignant tumors may be classified as: (1) autolytic, (2) necrotic, (3) growth-restraining. The autolytic

type of reaction occurs in a short period of time, with no signs of local necrosis or toxic constitutional reaction, and is observed in embryonal tumors or highly cellular, rapidly growing, vascular tumors. The second type of reaction, necrosis, is brought about by large doses of irradiation in highly differentiated, relatively resistant tumors, the individual cells of which may be even more resistant than the surrounding normal tissue cells; however, because of the accessibility (as in cervix, mouth, or face) they may be completely destroyed at the expense of local destruction of the immediately surrounding normal tissues. The final reaction of growth-restraint is effected by the production of large amounts of fibrous tissue about the tumor, thus choking off the blood supply to it. This type of reaction is sought for in large or extensive tumors where complete destruction by caustic irradiation is impossible. The author gives as a working dictum: "Never consider any malignant growth, no matter how small it may be or how slight the involvement may seem, to be insignificant, and conversely, never consider any malignant growth, no matter how large or extensive it may seem, to be hopeless, until it has been given the test of irradiation."

J. E. HABBE, M.D.

Roentgen Treatment of Uterine Fibromyomas. Francis Carter Wood. Jour. Am. Med. Assn., March 1, 1930, XCIV, 601.

There is still room for study and discussion concerning the best mode of treatment of fibromyomas of the uterus, asserts Wood. Large and hard, necrotic or calcified fibromyomas should be treated by surgical operation; also all those complicated by cystic disease of the ovary of any type, or acute or chronic inflammatory processes in the adnexa, with fever. The advantages of surgery are: its certainty in removing the fibroid; the possibility of avoiding sterilization in young women by myomectomy or partial hysterectomy; the relatively low mortality of the operation; the possibility of handling other pathologic conditions at the same time, and of removing the appendix as a protective measure.

On the side of irradiation, radium being considered first, the advantages are that most fibroids will shrink down considerably or even entirely disappear with a single treatment of about 1,500 milligram-hours. Menstruation may reappear after a short period of amenorrhea, in which case it is possible for the patient later to become pregnant. Radium necessitates hospitalization, and post-irradiation sickness may be just as serious as that following surgical removal. The expense of radium is also considerable.

The advantages of roentgen treatment are that the patient is ambulant; treatments are one or two weeks apart, not over twenty minutes each; as a rule no post-irradiation symptoms follow; radiation action is chiefly on the ovaries and there is no caustic effect observable on the endometrium. The cost can be made minimal. The chief disadvantage of both radium and X-rays is that they produce more or less permanent amenorrhea as a necessary part of the treatment.

C. G. SUTHERLAND, M.B. (Tor.)

ULTRA-VIOLET LIGHT

The Reflection and Absorption of the Human Skin in the Ultra-violet Region. Walther Schultze. Strahlentherapie, 1930, XXXV, 369.

The author studied, with an elaborate arrangement combining a double monochrometor, several photo-electric cells, and an electrometer, the reflection and absorption of the human skin in the ultra-violet region. Reflex maxima were found in the majority of cases at 3,660, 3,340, and 2,970 Å., while the highest absorption seems to be at 3,130 and 3,030 Å. A number of curves and tables illustrate the results in detail.

E. A. POHLE, M.D., PH.D.

Light Therapy of Chronic Recurring Erysipelas. Lothar Böhmer. Strahlentherapie, 1930, XXXV, 130.

A simple instrument is described consisting essentially of a frame with five subdivided

areas and a sliding cover. This can be fastened to the skin and permits the exposure of five small areas with increasing doses of ultra-violet light, in order to determine the individual susceptibility. The author reports ten cases of recurring erysipelas which received general body exposure with a quartz mercury vapor lamp. The patients responded well to the treatment, some remained free of recurrence, while in others, with one exception, the recurrence took a much milder course.

E. A. POHLE, M.D., PH.D.

On the Transparency of Plaster-of-Paris and Mica in the Ultra-violet Region. W. Hausmann and O. Krumpel. Strahlentherapie, 1930, XXXV, 387.

The authors studied the transparency of mica (thickness 0.15 mm. and 0.1 mm.) and also of plaster-of-Paris (thickness 4.6 mm. and 1.5 mm.) by means of a quartz spectrograph and a tungsten arc. It appeared that the transparency of plaster-of-Paris reached as far as 2,200 Å., regardless of the thickness, while mica of 0.1 mm. thickness transmitted as far as 3,200 Å., and 0.5 mm. thickness only as far as about 3,300 Å.

E. A. POHLE, M.D., PH.D.

On the Erythema Effect of the Ultra-violet Lamp (Osram-Vitaluxlampe). W. Vahle and A. Rüttenauer. Strahlentherapie, 1929, XXXIV, 425.

The lamp used in these experiments as source of ultra-violet radiation is constructed like an ordinary incandescent light bulb. Its bulb is made out of special glass which transmits ultra-violet rays of short wave length. The model used in the erythema tests had a reflector made of polished chrome, which reflects about 65 per cent of the wave length 3,000 Å. Curves are presented and photographs of skin reactions following exposure to the lamp at different distances and for different time periods.

E. A. POHLE, M.D., PH.D.

The Influence of the Dust in the Air in Large Cities on the Daylight Radiation, Particularly in the Ultra-violet Region. Erika Sutter. Strahlentherapie, 1929, XXXIV, 660.

Measurements of the sunlight intensity in the center and in the periphery of Berlin were carried out with a Michelson Actinometer, with potassium and with cadmium photoelectric cells. The direct sunlight intensity was found to be 20 per cent less in the center of the city, throughout the spectrum; no difference could be detected in the sky radiation. For the total radiation, the loss in the center of the city amounted to about 5 per cent. In narrow courts surrounded by buildings, the total light intensity was reduced about 90 per cent. A number of curves illustrate the results of the measurements in detail. It is suggested that the roofs of buildings shall be used more in order to obtain the proper radiation even in large cities.

E. A. POHLE, M.D., PH.D.

On the Effect of Ultra-violet Light on the Insensible Perspiration. St. Rothman. Strahlentherapie, 1930, XXXV, 381.

Light exposure in suberythema doses did not influence the insensible perspiration of the skin. If full erythema doses were applied, a reduction in the insensible perspiration could be demonstrated in one experiment.

E. A. POHLE, M.D., PH.D.

EXPERIENCED X-RAY TECHNICIAN desires position. Graduate of "Lette-haus," Berlin. Experience in hospitals and X-ray stations of Düsseldorf (Rhine) and Nürnberg (Bavaria). Last five years worked in Brazil in same clinic as chief of X-ray Department. Five years' experience as anesthetist. Speaks German, English and Portuguese. Address: Mrs. Geo. H. Hurst, Araguary, Minas, Brazil.

WANTED—Radiographer for one month's substitute work in hospital, New York state. Apply X-Ray Technicians Service Company, Inc., 1476 Selby Avenue, Saint Paul, Minnesota.

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